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1997 Summer Groundfish Survey update for selected Scotia-Fundy groundfish stocks, including a revised projection of silver hake catch using the survey estimate of the 1996 yearclass.

R. Branton, J. Black, and M. Showell

Department of Fisheries and Oceans
Maritimes Region, Science Branch
Bedford Institute of Oceanography
1 Challenger Drive, Dartmouth
Nova Scotia, B2Y 4A2
Canada

[1] This series documents the scientific basis for the evaluation of fisheries resources in Canada. As such, it addresses the issues of the day in the time frames required and the documents it contains are not intended as definitive statements on the subjects addressed but rather as progress reports on ongoing investigations.

Research documents are produced in the official language in which they are provided to the Secretariat.

[1] La présente série documente les bases scientifiques des évaluations des ressources halieutiques du Canada. Elle traite des problèmes courants selon les échéanciers dictés. Les documents qu'elle contient ne doivent pas être considérés comme des énoncés définitifs sur les sujets traités, mais plutôt comme des rapports d'étape sur les études en cours.

Les documents de recherche sont publiés dans la langue officielle utilisée dans le manuscrit envoyé au secrétariat.

Abstract

A synopsis of the results of the 1997 summer bottom trawl survey on the Scotian Shelf and Bay of Fundy is provided. This information is used in assessment meetings as a key source of information on trends for selected groundfish stocks. A revised projection of the silver hake catch at $F_{0.1}$ in 1998 is provided based on the 1997 survey estimate of the strength of the 1996 year class.

Résumé

On présente un synopsis des résultats du relevé au chalut de fond du plateau néo-écossais et de la baie de Fundy réalisé à l'été de 1997. Ces renseignements sont utilisés au cours des réunions d'évaluation à titre de source d'information clé sur les tendances de certains stocks de poisson de fond. On trouve aussi une projection révisée des captures de merlu argenté au niveau $F_{0,1}$ pour 1998 qui repose sur l'estimation de l'effectif de la classe d'âge de 1996 obtenue à partir des résultats du relevé de 1997.

Introduction

The annual groundfish bottom trawl survey was conducted on the Scotian Shelf and Bay of Fundy as planned from 2 July to 1 August 1997. The results of this survey were compiled for selected stocks to provide clients with a preliminary view of biomass, abundance, size composition, and distribution as determined by the survey. The groundfish stocks covered by the report and the lead scientific investigator are listed in Table 1. The distribution of sampling effort compared with the past three years is shown in Figures 1 to 4. Resource trends for each stock are shown in Figures 5 to 92.

More comprehensive interpretations of stock status are contained in stock assessment documents prepared annually for the stocks described here. Such reports contain information on commercial fishery catch rates and other survey results when available. Therefore, the abundance trends reported here, based on the survey information only, are not directly comparable to those provided in recent assessments. However, a revised projection of catch in 1998 for Div. 4VWX silver hake, based on the survey estimate of the 1996 year class, is provided as follow-up to the NAFO Scientific Council's June 1997 report (Appendix 1).

Survey Description

The 28th annual Scotian Shelf groundfish survey was conducted from the research vessel CSS *Alfred Needler* out of the Bedford Institute of Oceanography, Dartmouth, N.S., on two trips N726 (2-16 July 1997) and N734 (21 July - 1 August 1997). Two hundred and eight fishing stations, from the Upper Bay of Fundy to the northern tip of Cape Breton and offshore to the 400 fathom contour, were completed.

Samples were obtained with a Western IIA bottom trawl towed for 30 minutes at a speed of 3.5 knots. The trawl has a 106 foot roller-rigged footrope and 2000 pound Portuguese doors. The codend is lined with 3/4 inch mesh to retain small fish. All finfish caught were sampled for length and weight and some species were sampled additionally for otoliths to determine age and for evidence of sexual maturity. Vertical profiles of temperature, salinity, nutrients and oxygen were observed at all fishing stations.

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Table 1. Name of the stock, figure list, as well as name, telephone number and email address of the lead investigator for each groundfish stock observed on 1997 summer bottom trawl survey.

Stock	Figures	Investigator	Telephone	E-mail
4Vn Cod	5 - 8	Mohn	(902)426-4592	MohnB@mar.dfo-mpo.gc.ca
4VsW Cod	9 - 12	Fanning	(902)426-3190	FanningP@mar.dfo-mpo.gc.ca
4X Cod	13 - 16	Clark	(506)529-8854	ClarkD@mar.dfo-mpo.gc.ca
4VW Haddock	17 - 20	Frank	(902)426-3498	FrankK@mar.dfo-mpo.gc.ca
4X Haddock	21 - 24	Hurley	(902)426-3520	HurleyP@mar.dfo-mpo.gc.ca
4VWX Pollock	25 - 28	Neilson	(506)529-8854	NeilsonJ@mar.dfo-mpo.gc.ca
Unit 3 Redfish	29 - 32	Branton	(902)426-3537	BrantonB@mar.dfo-mpo.gc.ca
4VW Plaice	33 - 36	Stobo	(902)426-3316	StoboW@mar.dfo-mpo.gc.ca
4VW Yellowtail	37 - 40	Stobo	(902)426-3316	StoboW@mar.dfo-mpo.gc.ca
4VW Witch	41 - 44	McRuer	(902)426-3585	McRuer@mar.dfo-mpo.gc.ca
4VW Winter Flounder	45 - 48	Stobo	(902)426-3316	StoboW@mar.dfo-mpo.gc.ca
4X Plaice	49 - 52	Stobo	(902)426-3316	StoboW@mar.dfo-mpo.gc.ca
4X Yellowtail	53 - 58	Stobo	(902)426-3316	StoboW@mar.dfo-mpo.gc.ca
4X Witch	57 - 60	McRuer	(902)426-3585	McruerJ@mar.dfo-mpo.gc.ca
4X Winter Flounder	61 - 64	Stobo	(902)426-3316	StoboW@mar.dfo-mpo.gc.ca
4VWX Halibut	65 - 68	Zwanenburg	(902)426-3310	ZwanenburgK@mar.dfo-mpo.gc.ca
4VWX Silver Hake	69 - 72	Showell	(902)426-3501	ShowellM@mar.dfo-mpo.gc.ca
4VsW Winter Skate	73 - 76	Simon	(902)426-4136	SimonJ@mar.dfo-mpo.gc.ca
4VWX Monkfish	77 - 80	Beanlands	(902)426-3515	BeanlandsD@mar.dfo-mpo.gc.ca
4VWX White Hake	81 - 84	Sinclair, M.	(902)426-4890	SinclairM@mar.dfo-mpo.gc.ca
4VWX Wolffish	85 - 88	Zwanenburg	(902)426-3310	ZwanenburgK@mar.dfo-mpo.gc.ca
4VWX Cusk	89 - 92	Comeau	(902)426-4136	ComeauP@mar.dfo-mpo.gc.ca

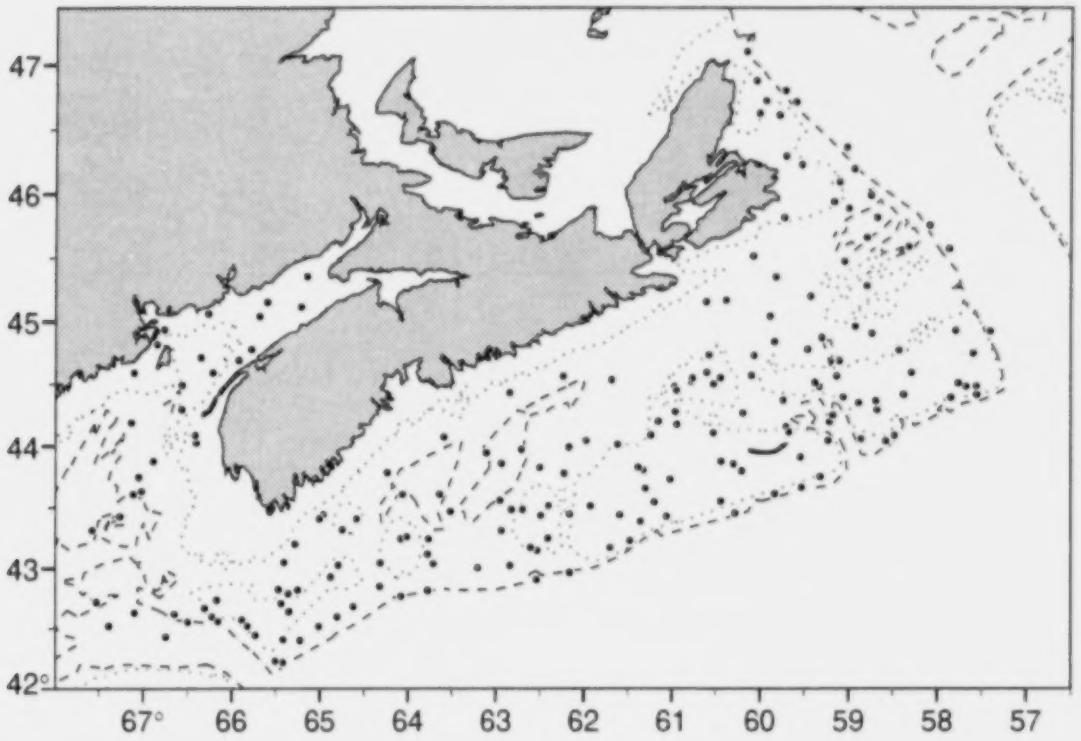


Fig. 1. Summer Groundfish Survey Positions 1994

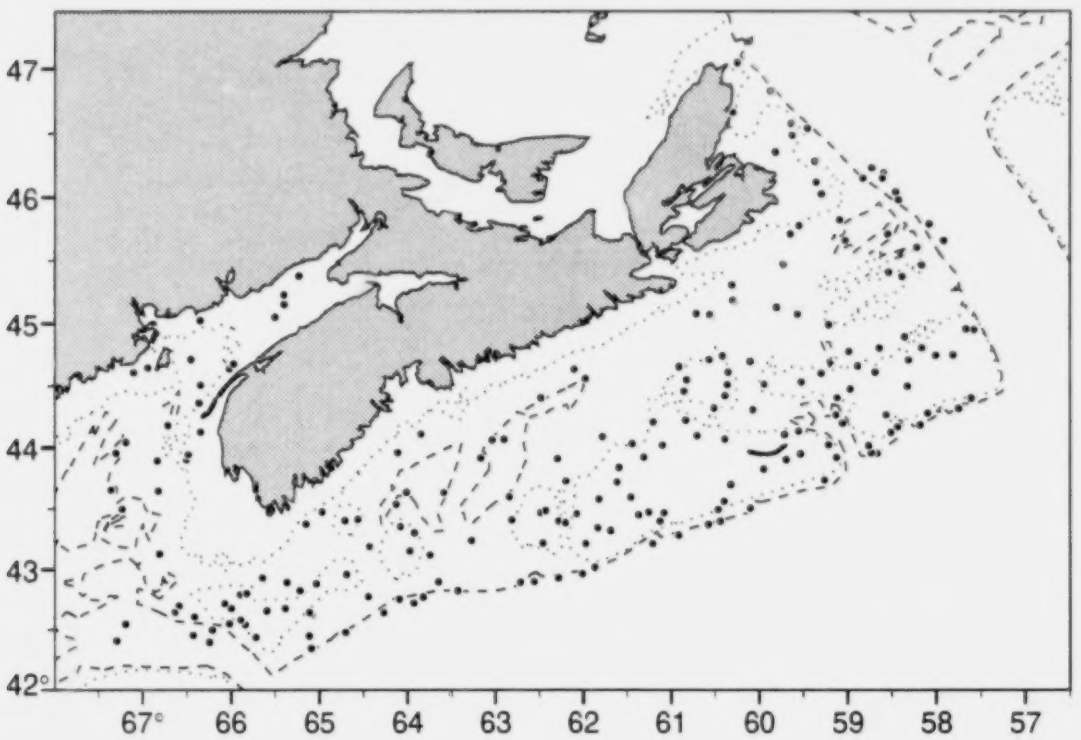


Fig. 2. Summer Groundfish Survey Positions 1995

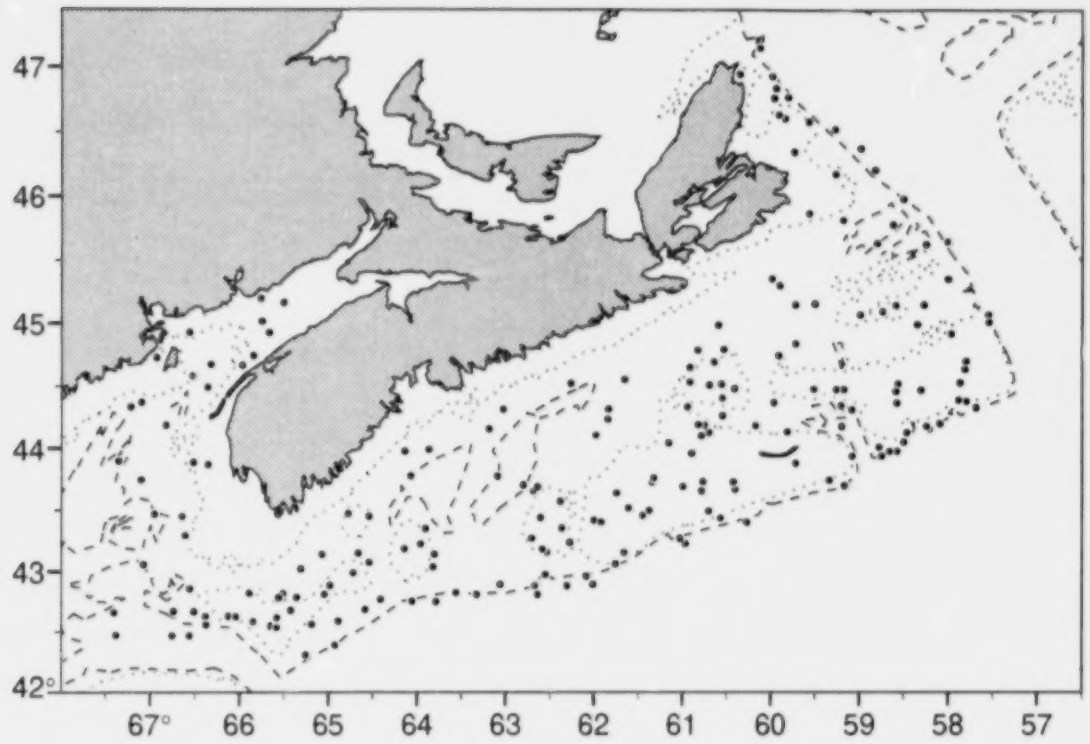


Fig. 3. Summer Groundfish Survey Positions 1996

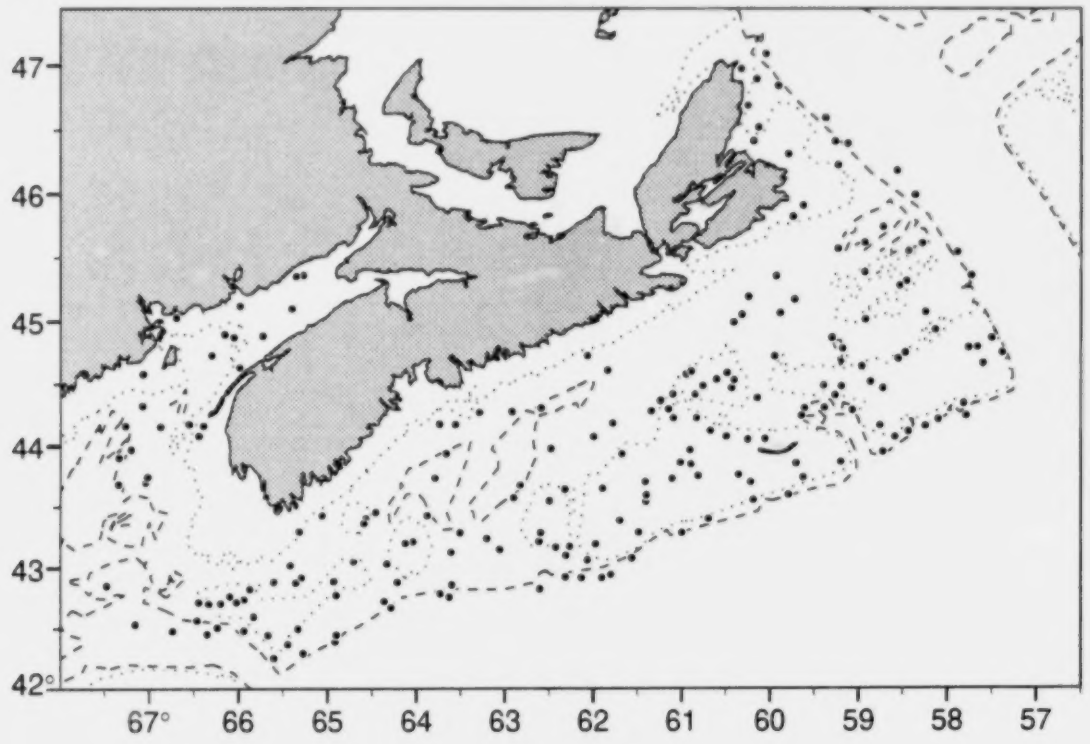


Fig. 4. Summer Groundfish Survey Positions 1997

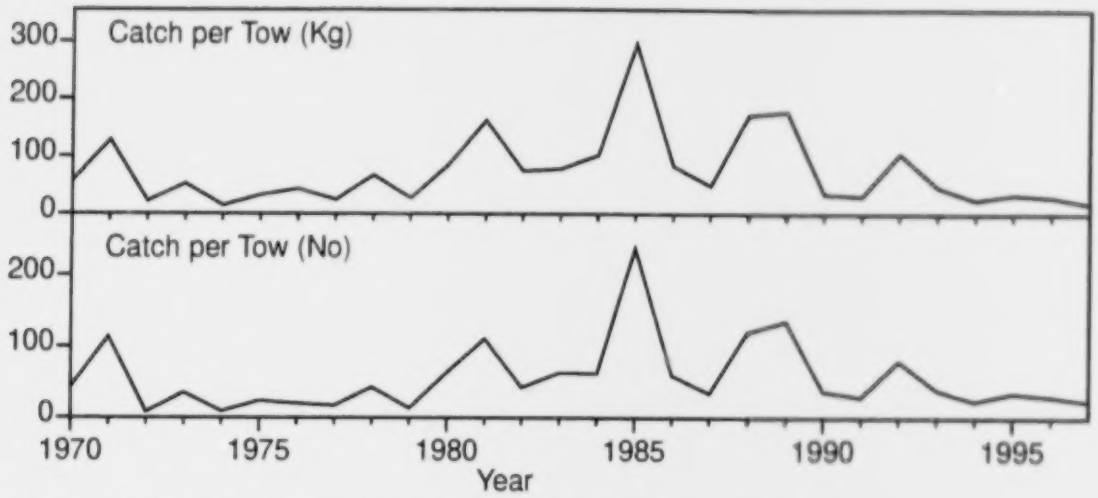


Fig. 5. 4Vn Cod stratified mean Weight and Number caught per tow from the Summer surveys.

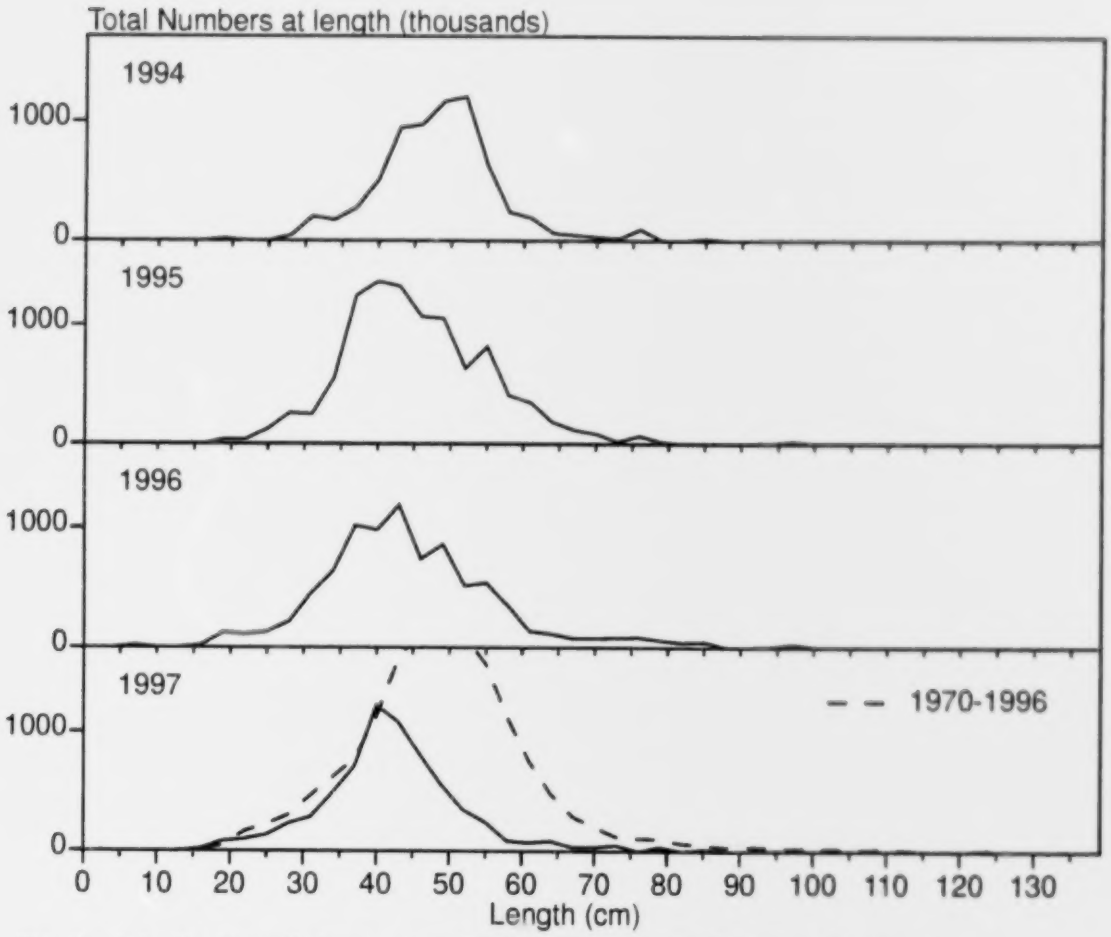


Fig. 6. 4Vn Cod length frequency distribution from the Summer surveys.

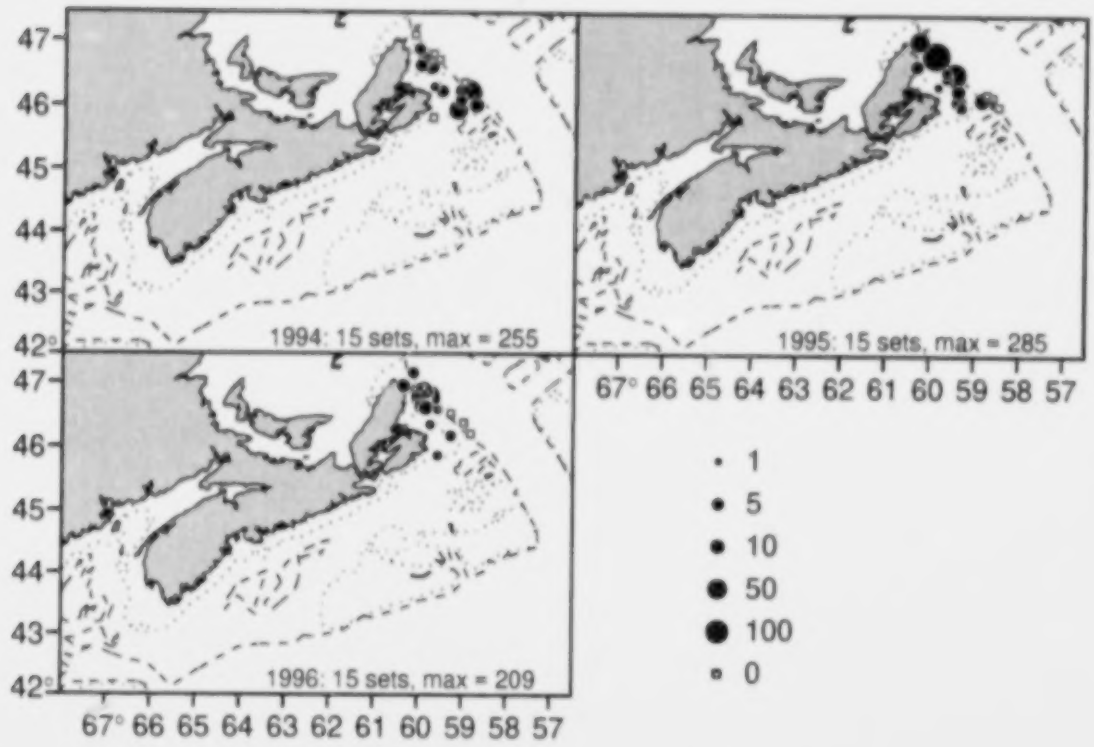


Fig. 7. 4Vn Cod Biomass (kg/tow) from the 1994-1996 Summer Groundfish Survey.

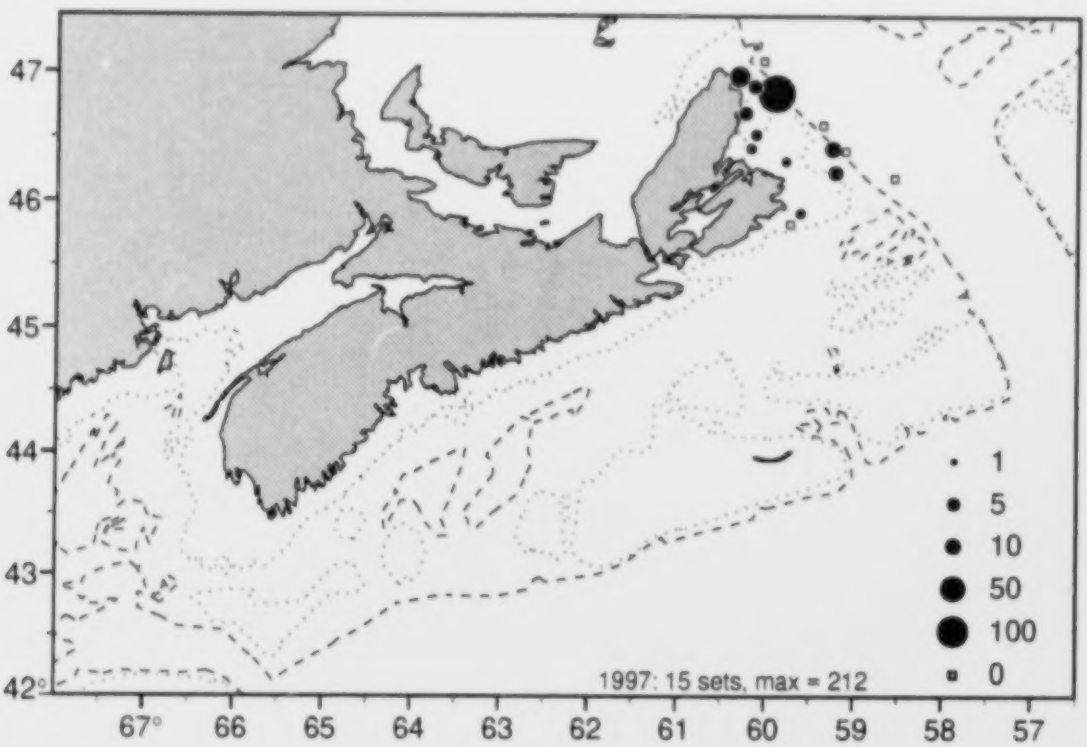


Fig. 8. 4Vn Cod Biomass (kg/tow) from the 1997 Summer Groundfish Survey.

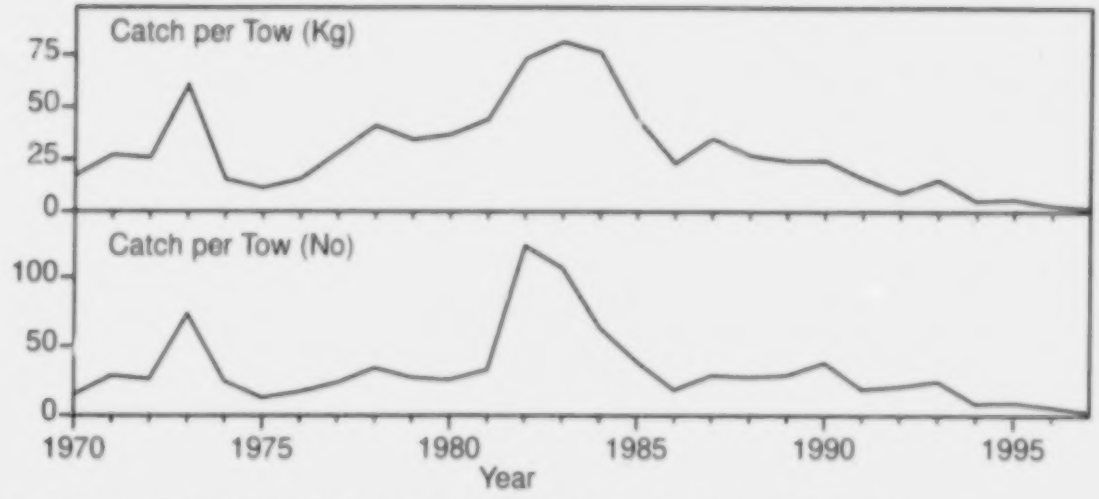


Fig. 9. 4VsW Cod stratified mean Weight and Number caught per tow from the Summer surveys.

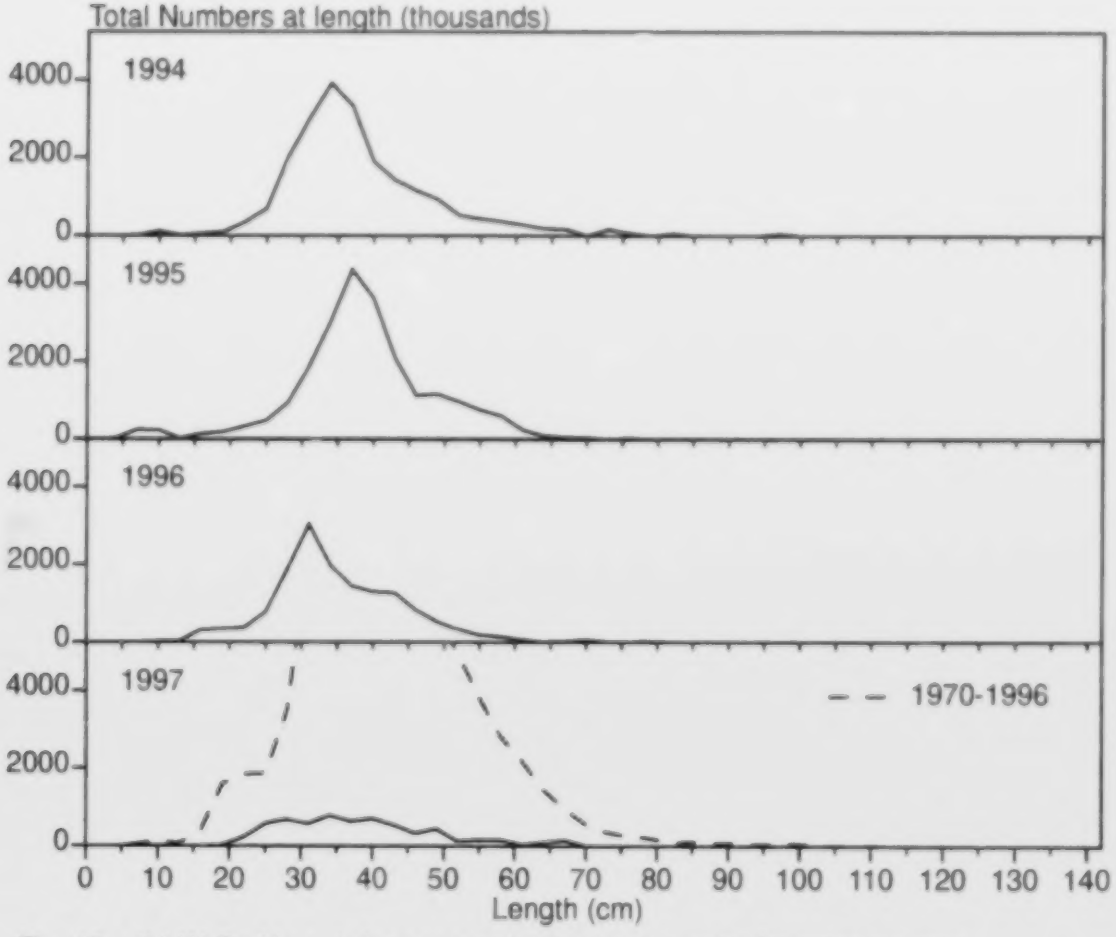


Fig. 10. 4VsW Cod length frequency distribution from the Summer surveys.

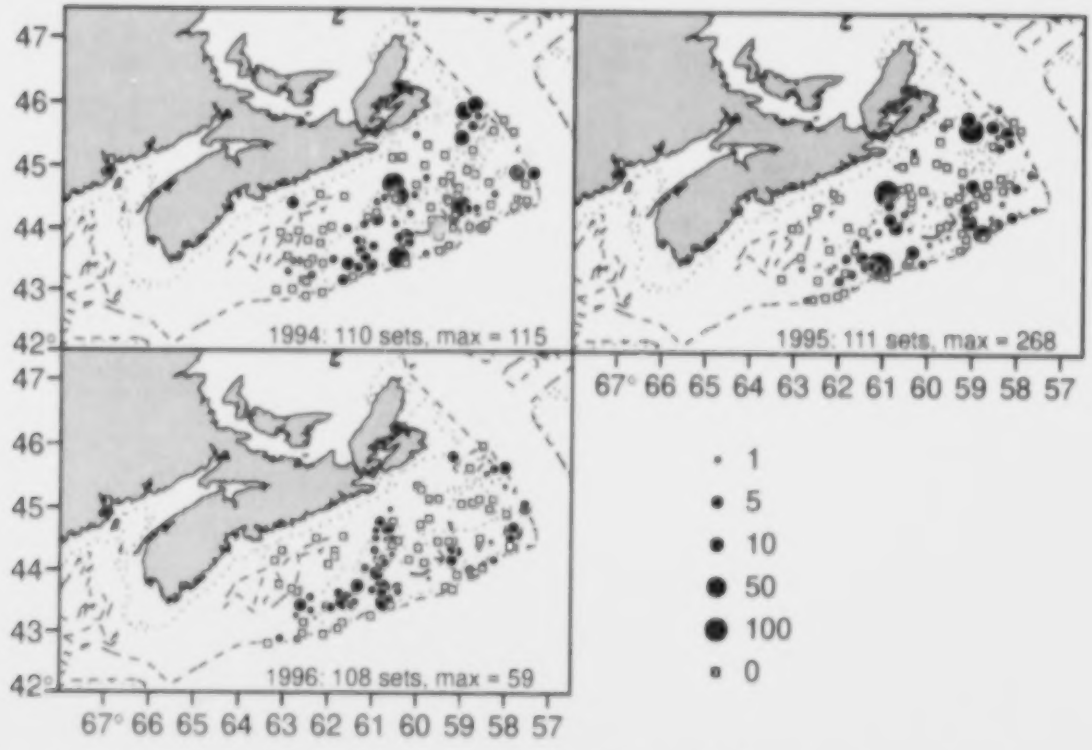


Fig. 11. 4VsW Cod Biomass (kg/tow) from the 1994-1996 Summer Groundfish Survey.

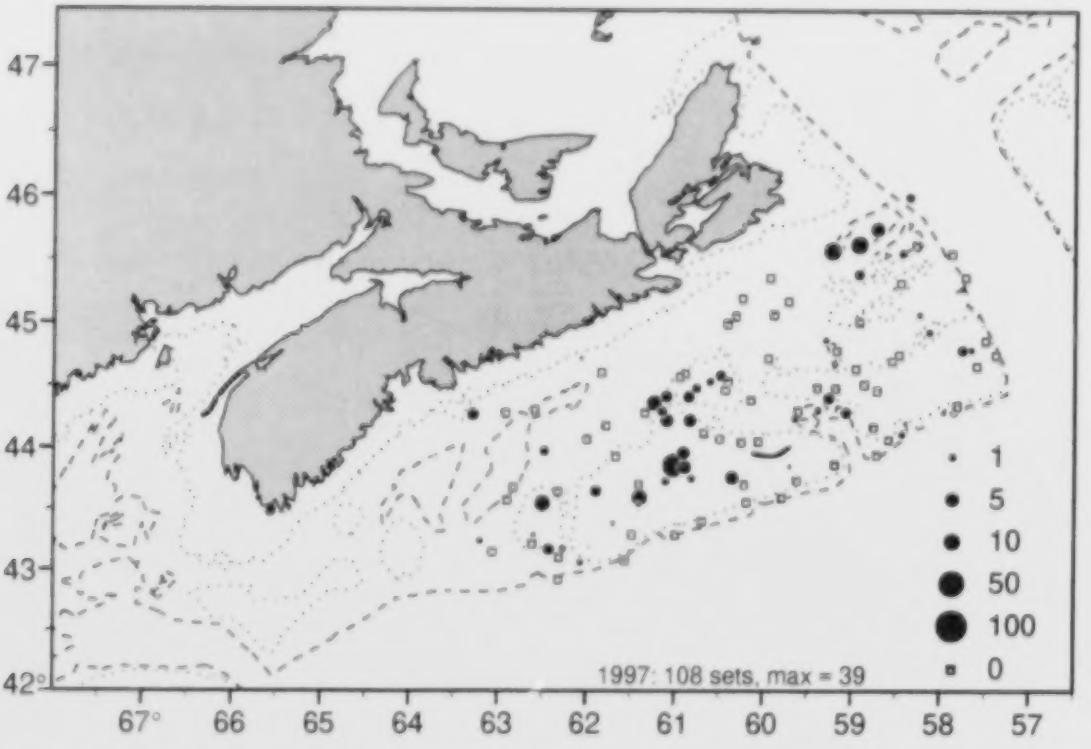


Fig. 12. 4VsW Cod Biomass (kg/tow) from the 1997 Summer Groundfish Survey.

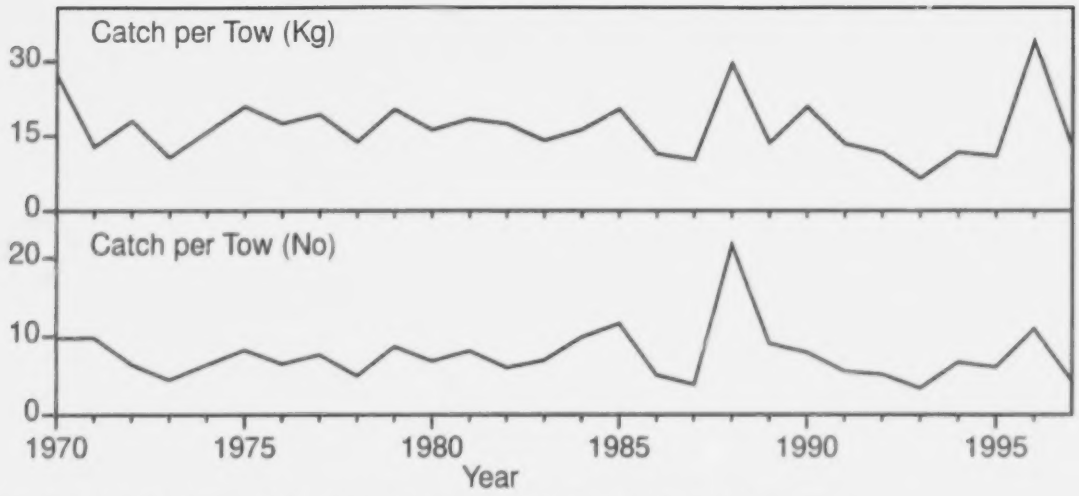


Fig. 13. 4X Cod stratified mean Weight and Number caught per tow from the Summer surveys.

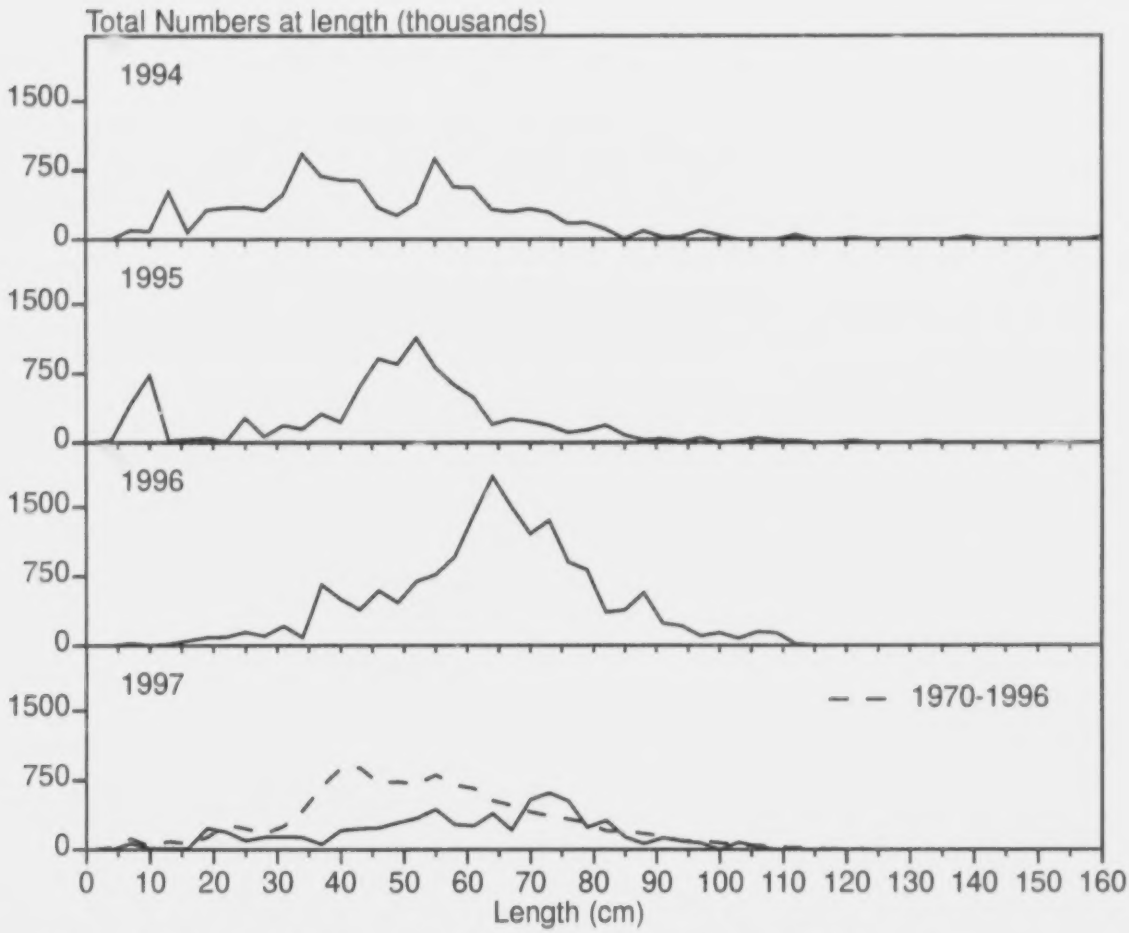


Fig. 14. 4X Cod length frequency distribution from the Summer surveys.

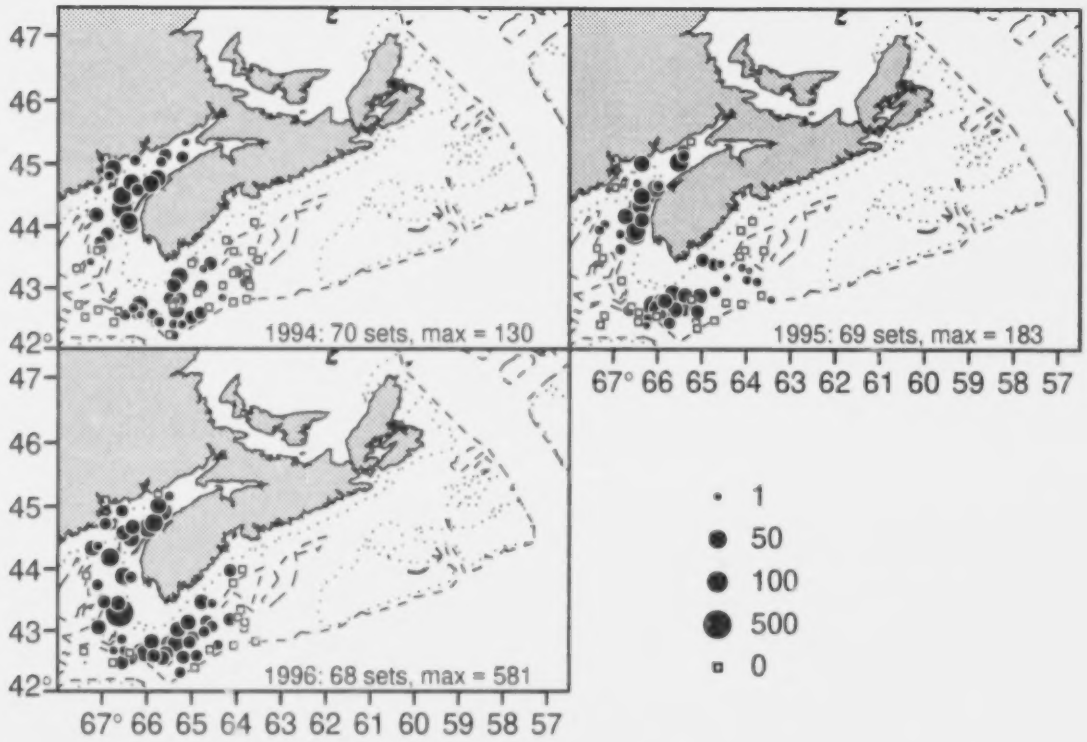


Fig. 15. 4X Cod Biomass (kg/tow) from the 1994-1996 Summer Groundfish Survey.

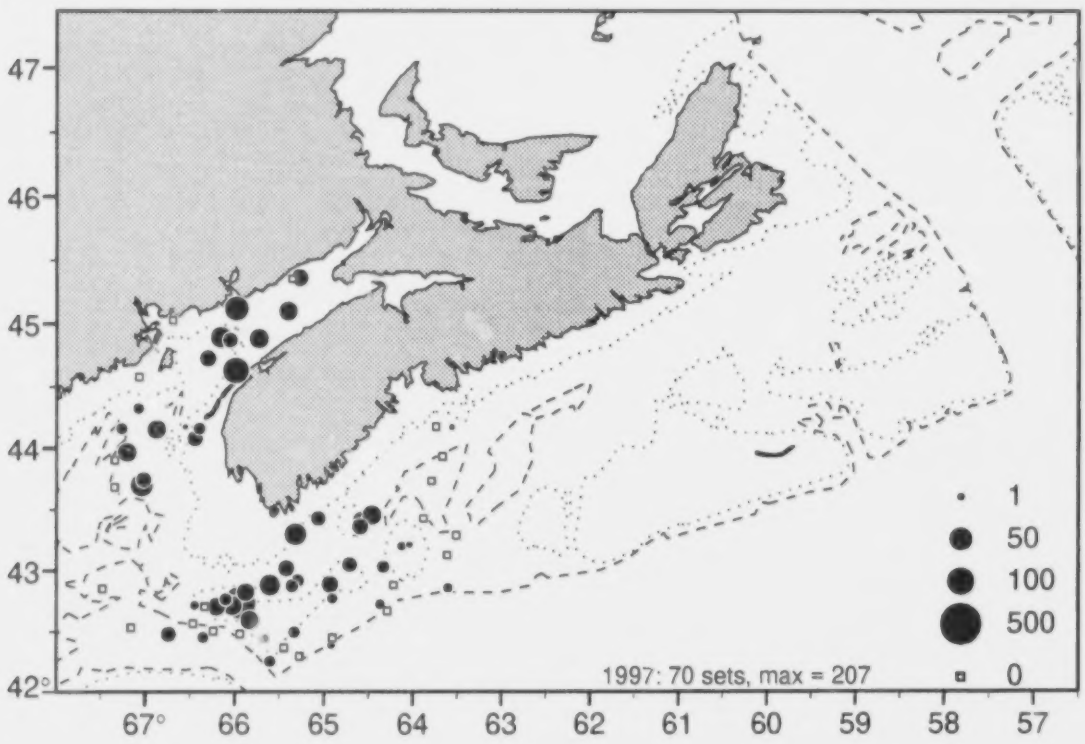


Fig. 16. 4X Cod Biomass (kg/tow) from the 1997 Summer Groundfish Survey.

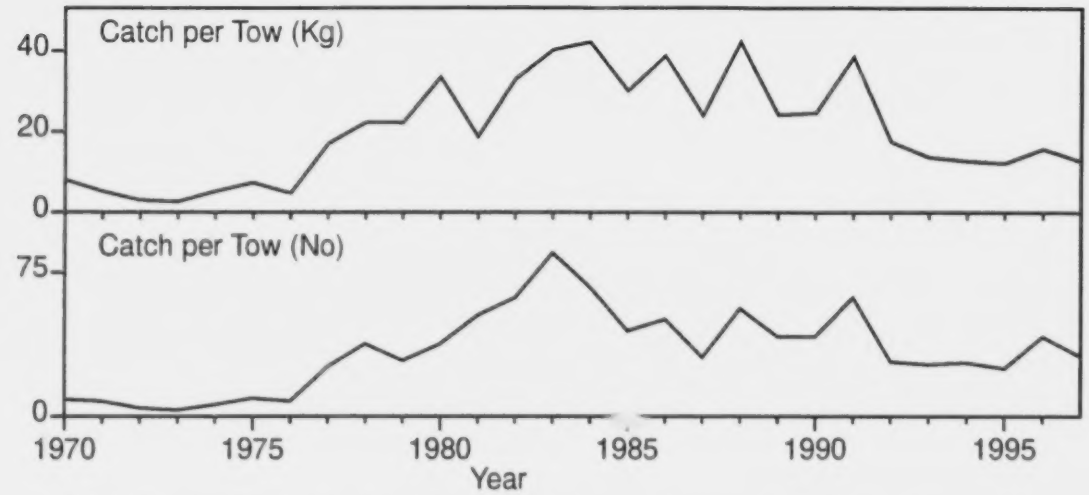


Fig. 17. 4VW Haddock stratified mean Weight and Number caught per tow from the Summer surveys.

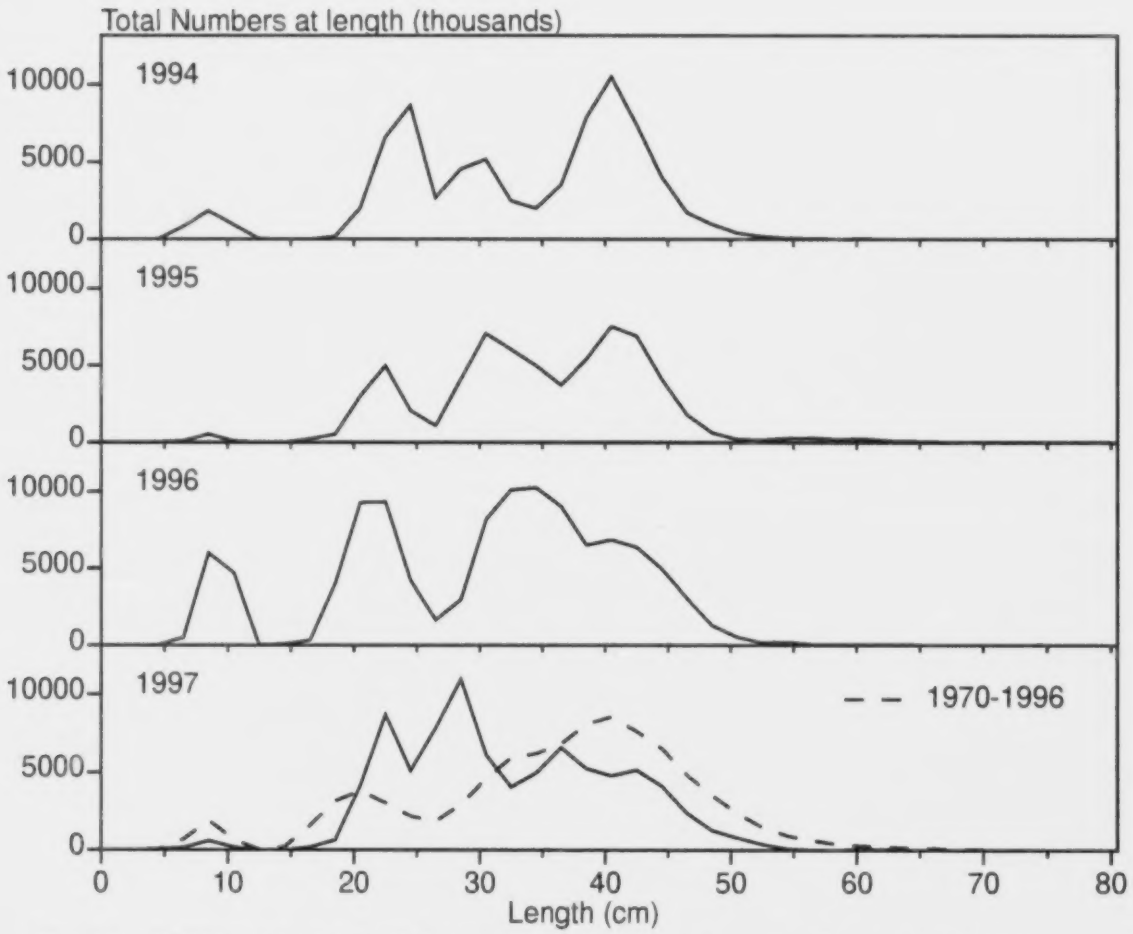


Fig. 18. 4VW Haddock length frequency distribution from the Summer surveys.

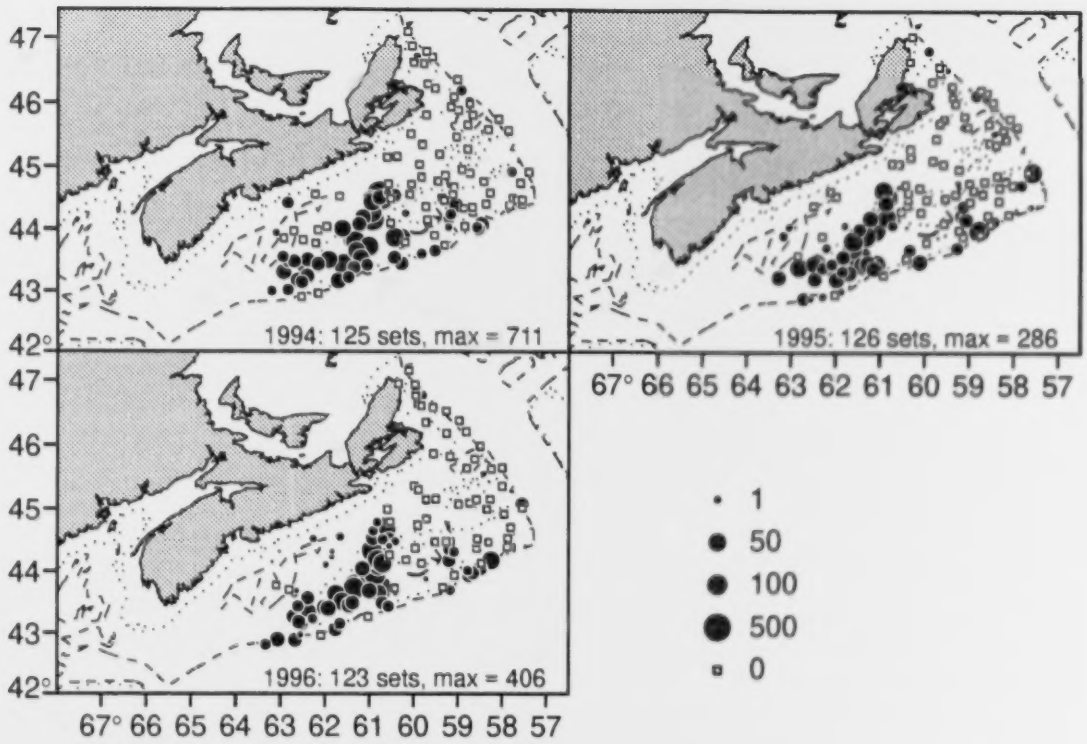


Fig. 19. 4VW Haddock Biomass (kg/tow) from the 1994-1996 Summer Groundfish Survey.

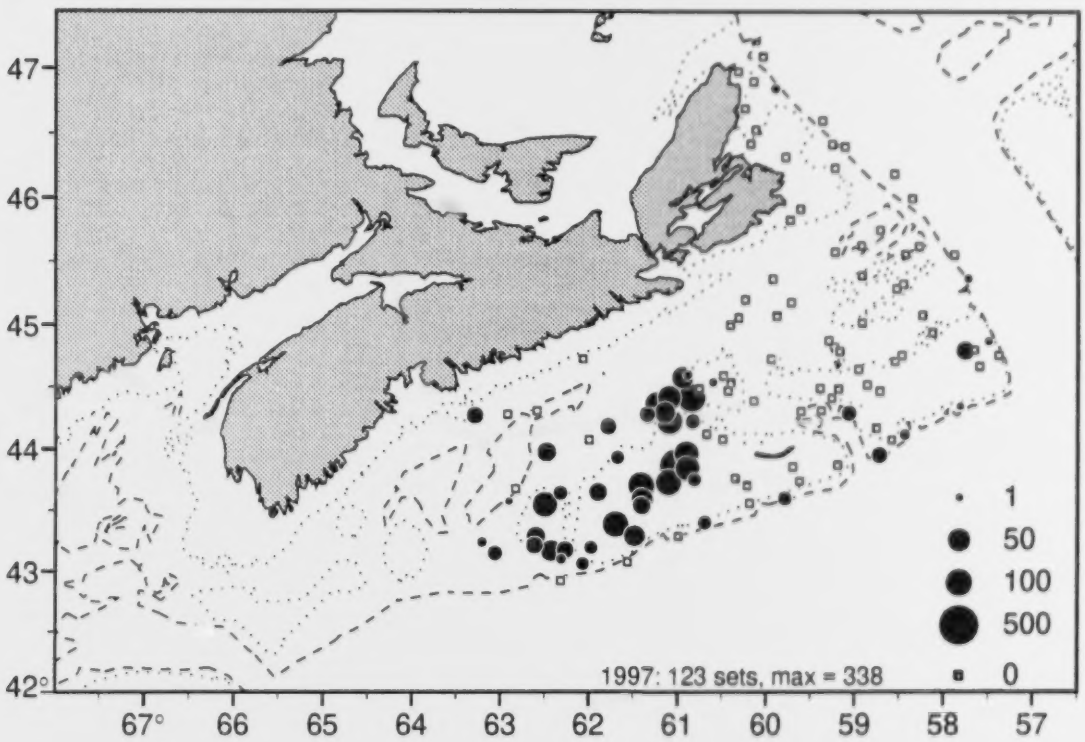


Fig. 20. 4VW Haddock Biomass (kg/tow) from the 1997 Summer Groundfish Survey.

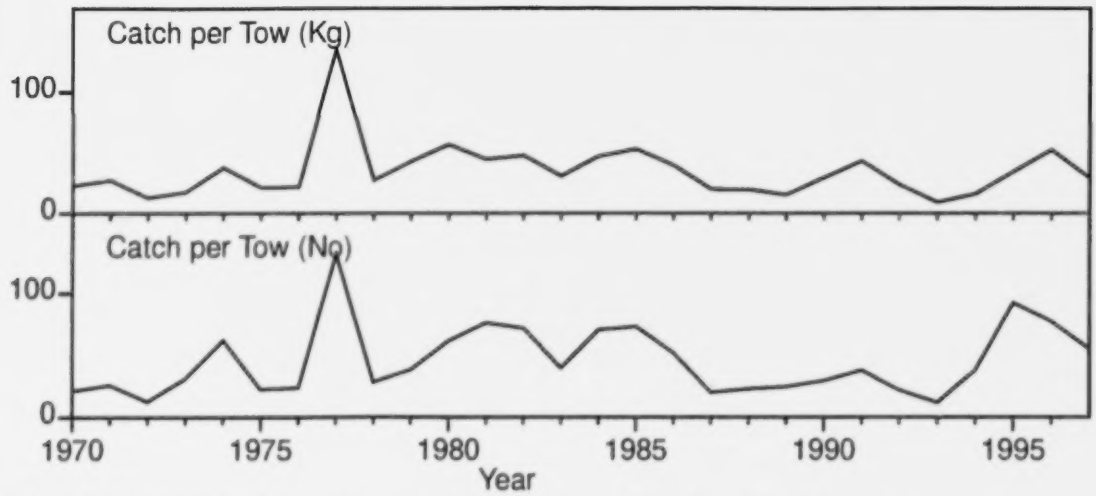


Fig. 21. 4X Haddock stratified mean Weight and Number caught per tow from the Summer surveys.

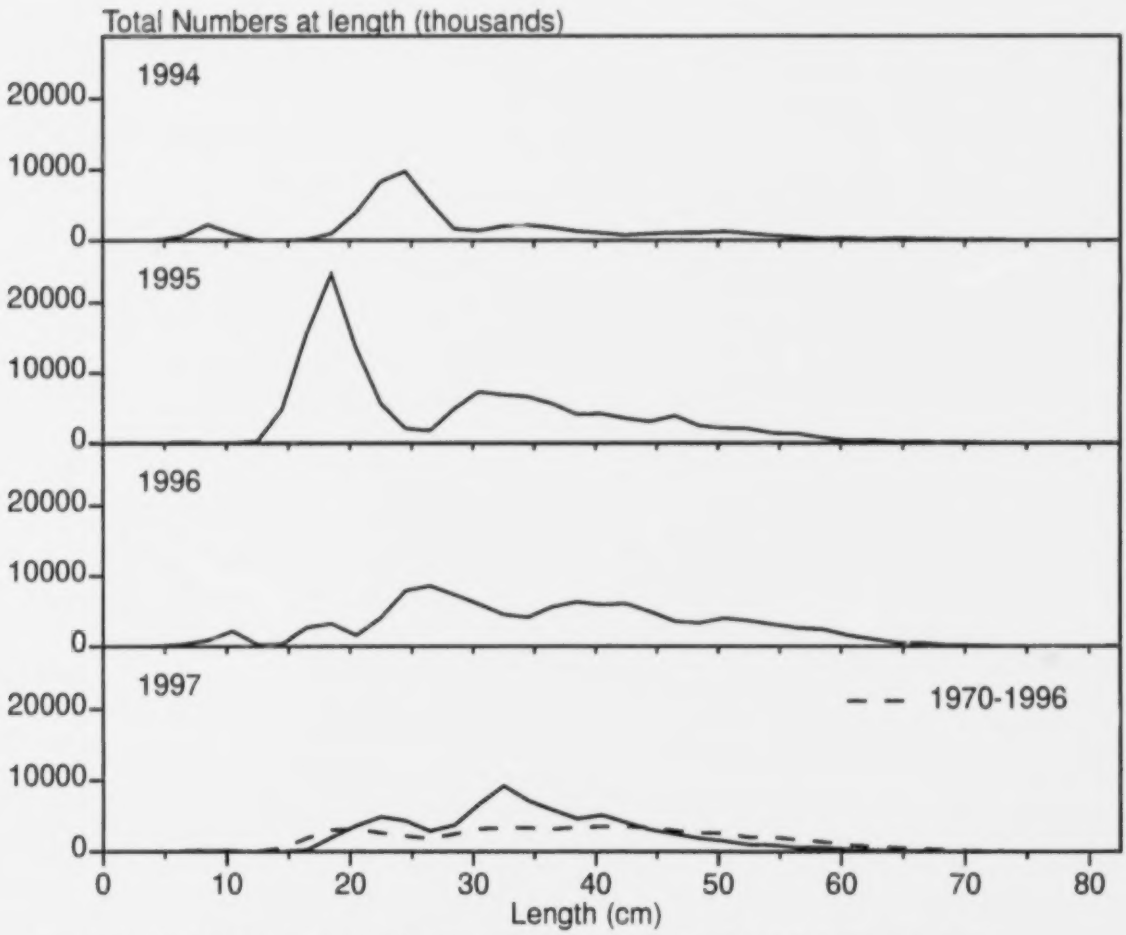


Fig. 22. 4X Haddock length frequency distribution from the Summer surveys.

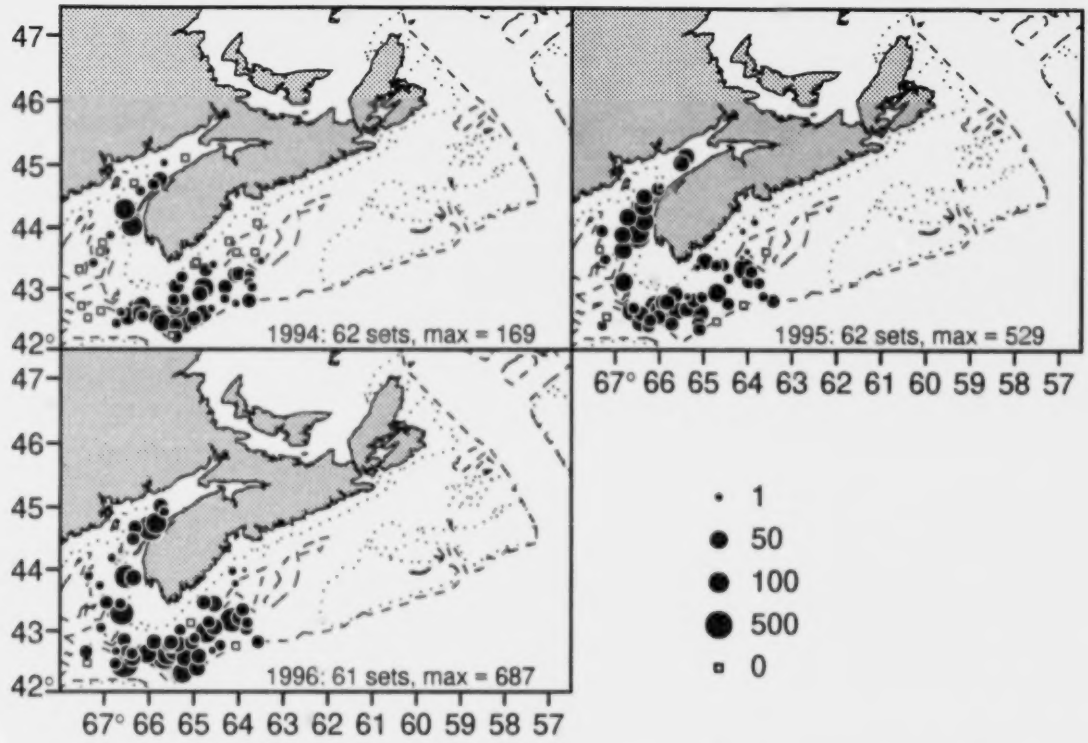


Fig. 23. 4X Haddock Biomass (kg/tow) from the 1994-1996 Summer Groundfish Survey.

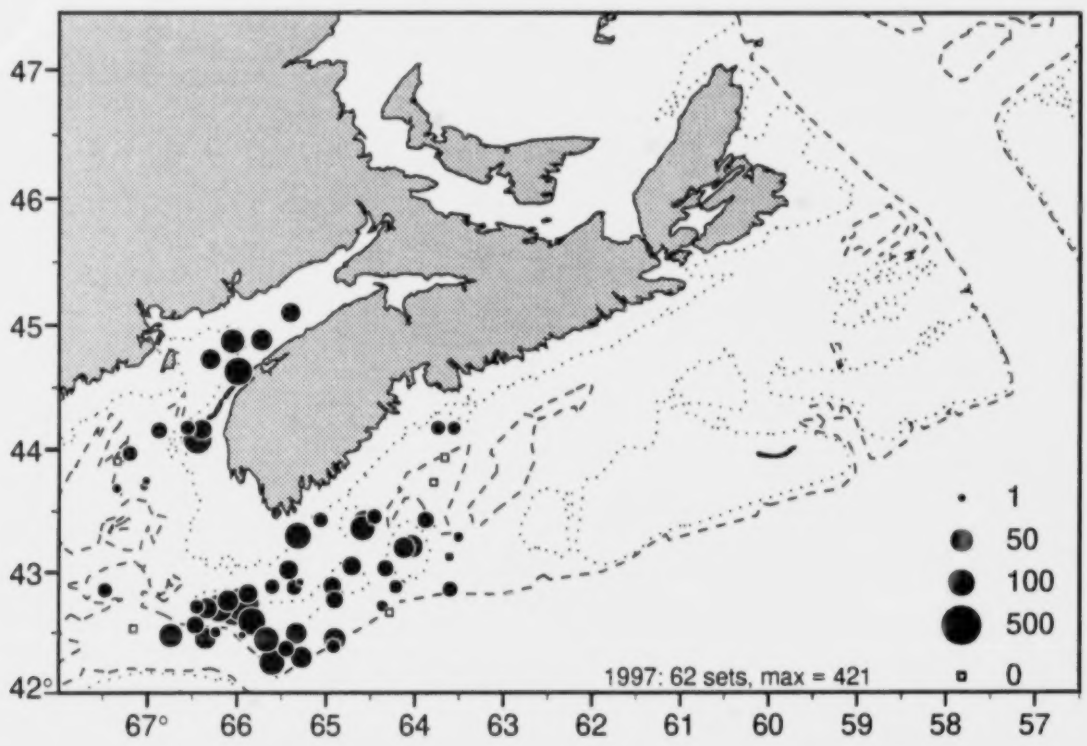


Fig. 24. 4X Haddock Biomass (kg/tow) from the 1997 Summer Groundfish Survey.

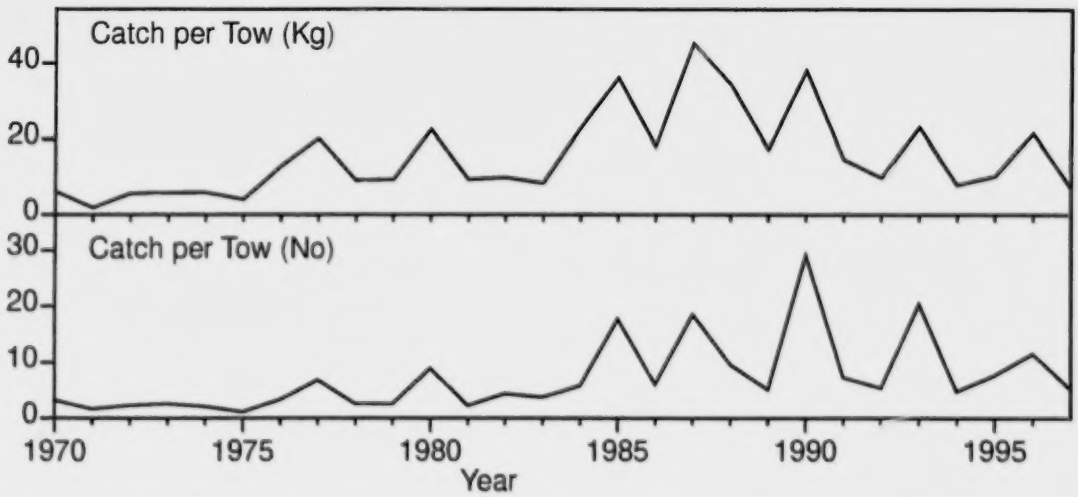


Fig. 25. 4VWX Pollock stratified mean Weight and Number caught per tow from the Summer surveys.

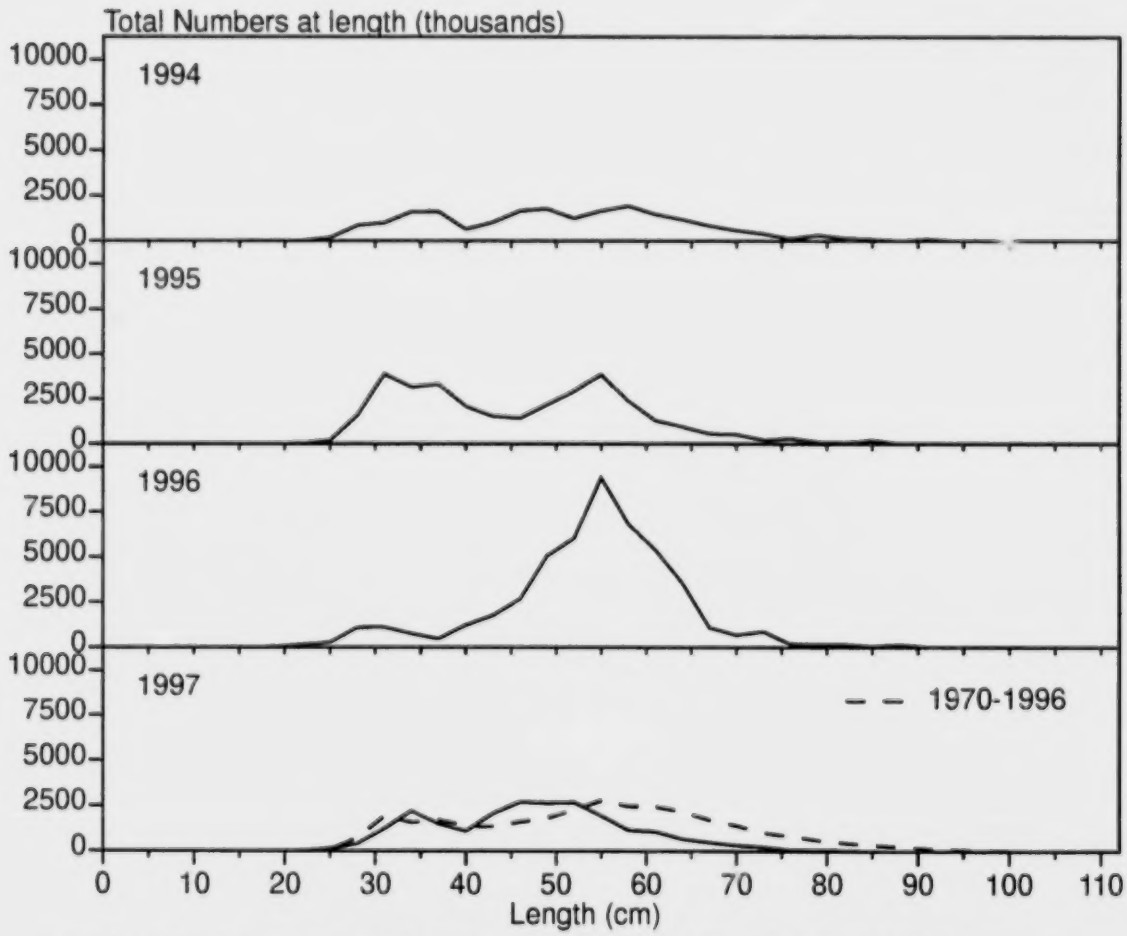


Fig. 26. 4VWX Pollock length frequency distribution from the Summer surveys.

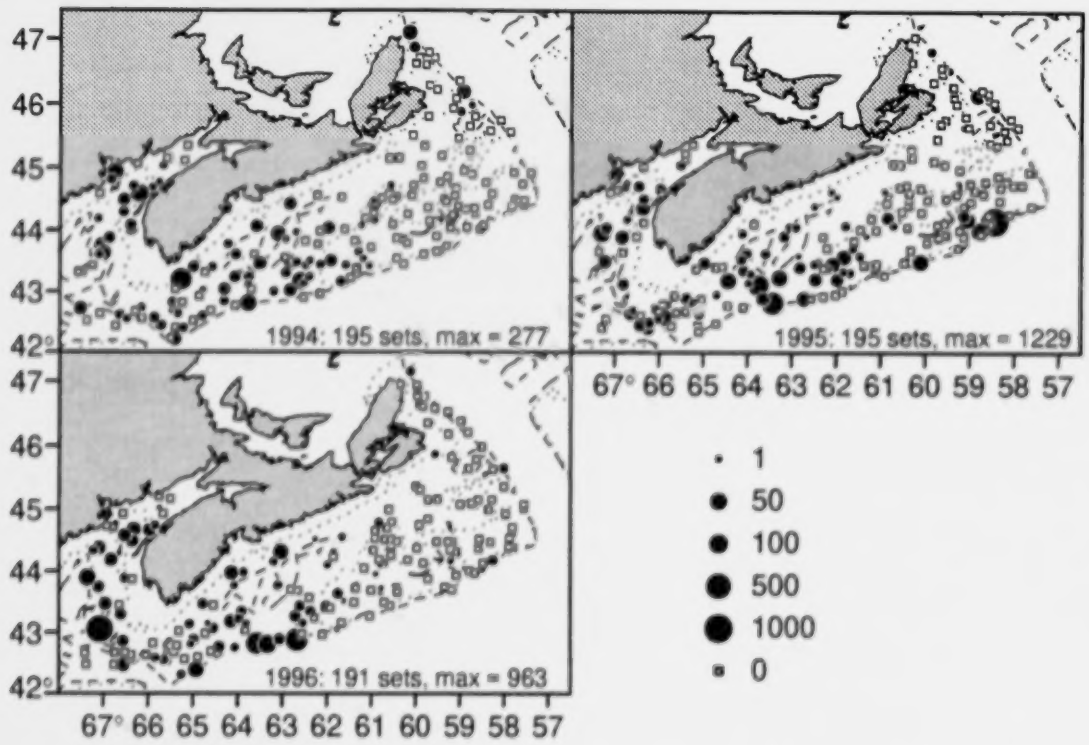


Fig. 27. 4VWX Pollock Biomass (kg/tow) from the 1994-1996 Summer Groundfish Survey.

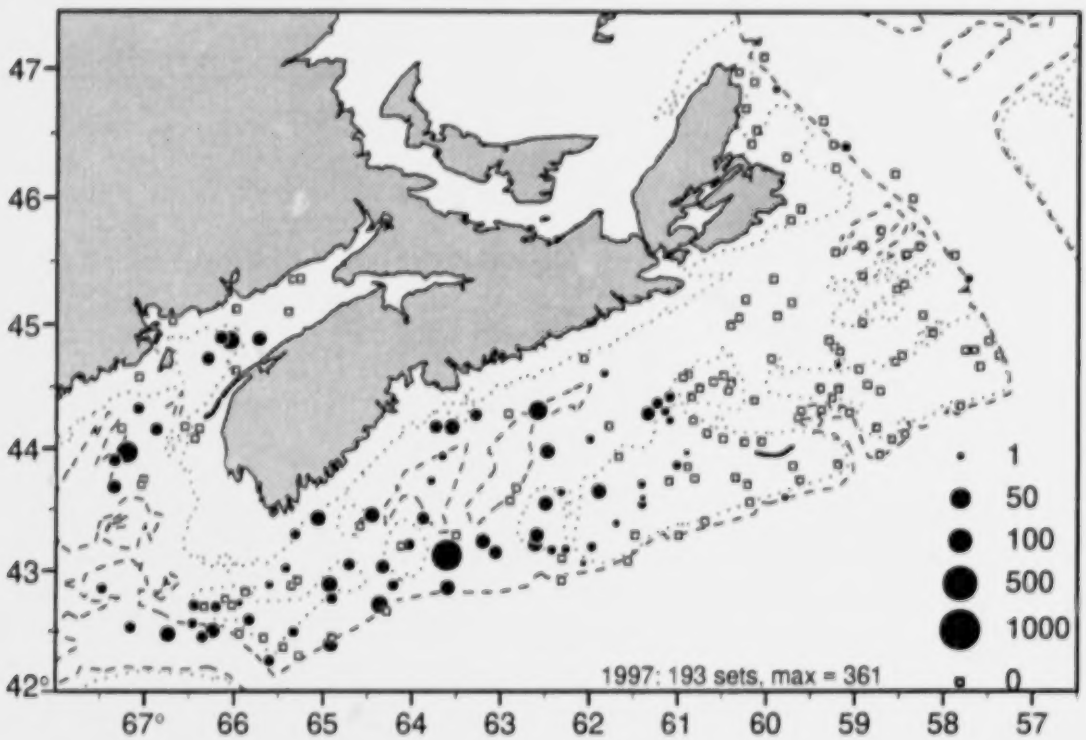


Fig. 28. 4VWX Pollock Biomass (kg/tow) from the 1997 Summer Groundfish Survey.

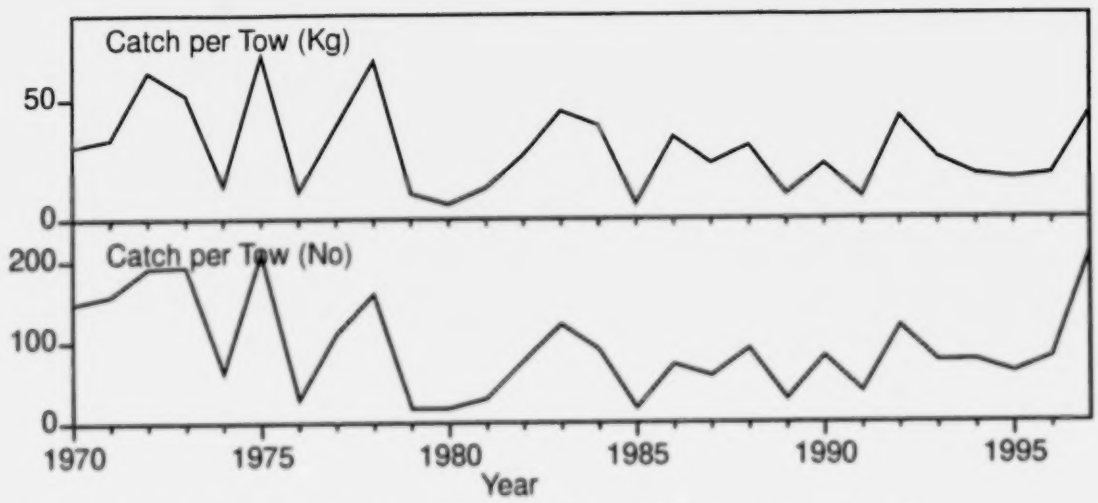


Fig. 29. Unit 3 Redfish stratified mean Weight and Number caught per tow from the Summer surveys.

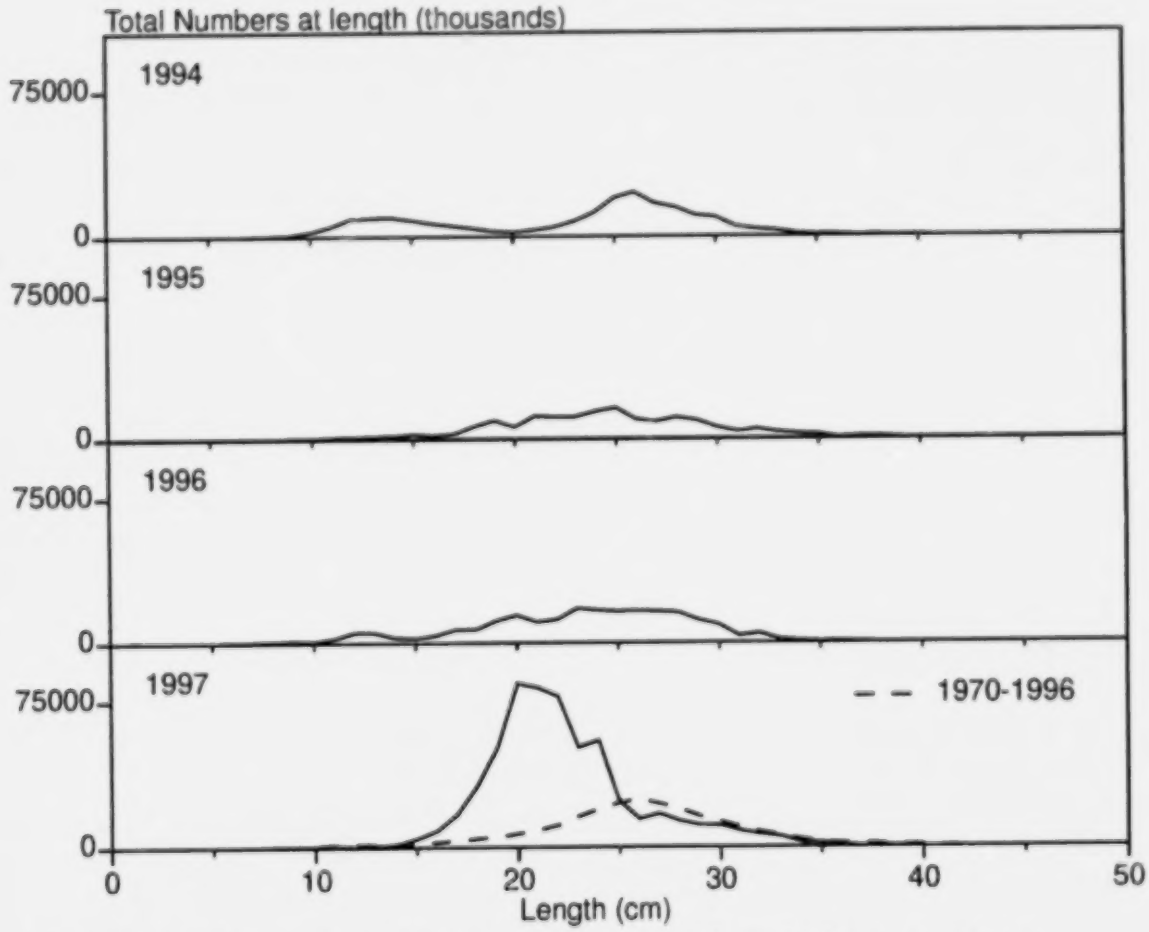


Fig. 30. Unit 3 Redfish length frequency distribution from the Summer surveys.

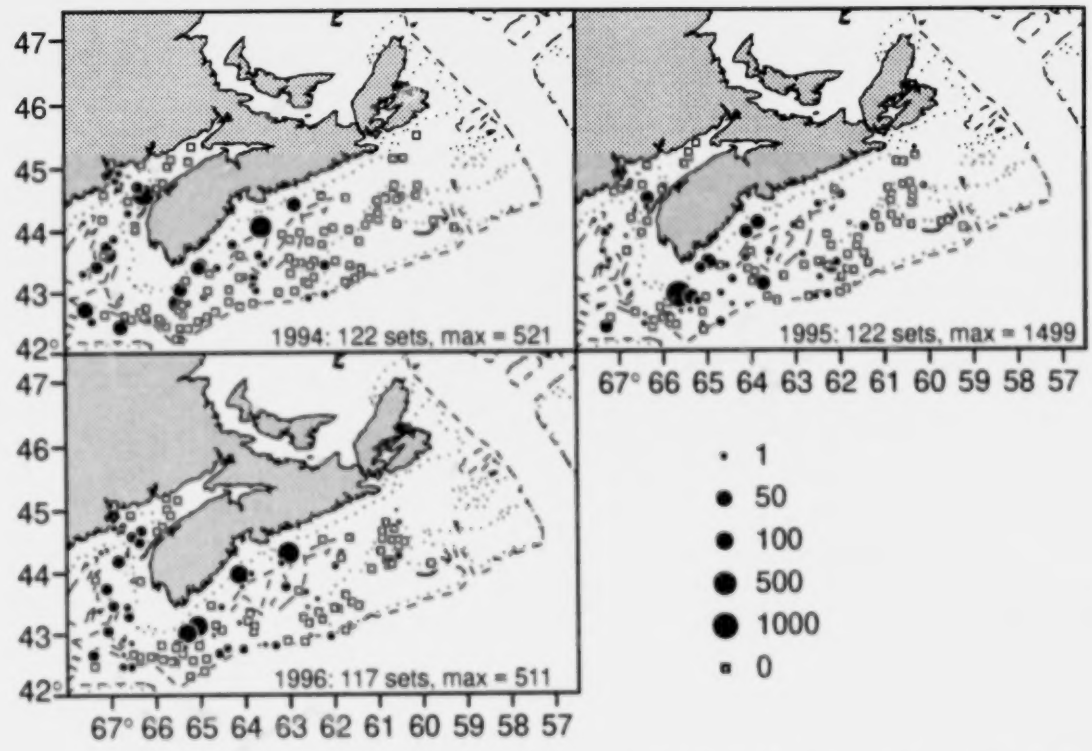


Fig. 31. Unit 3 Redfish Biomass (kg/tow) from the 1994-1996 Summer Groundfish Survey.

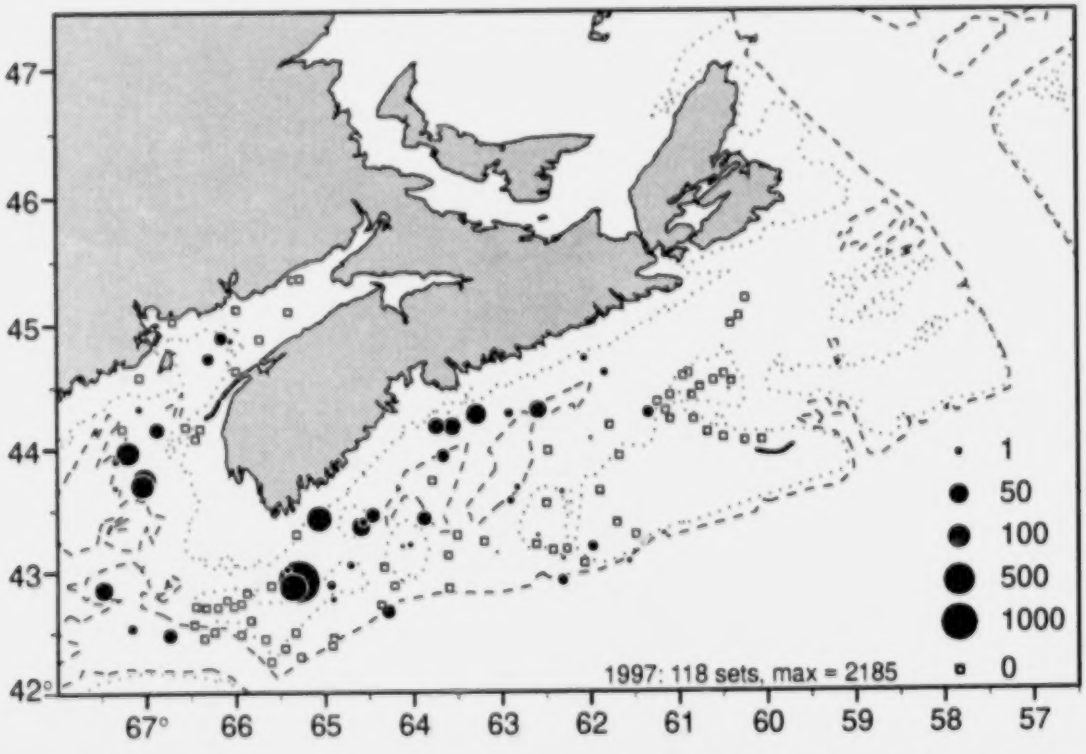


Fig. 32. Unit 3 Redfish Biomass (kg/tow) from the 1997 Summer Groundfish Survey.

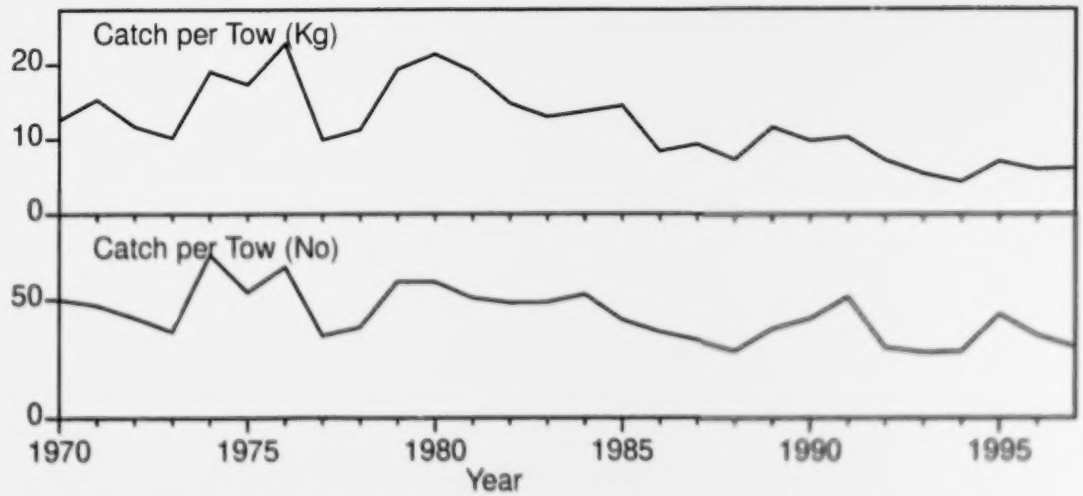


Fig. 33. 4VW Plaice stratified mean Weight and Number caught per tow from the Summer surveys.

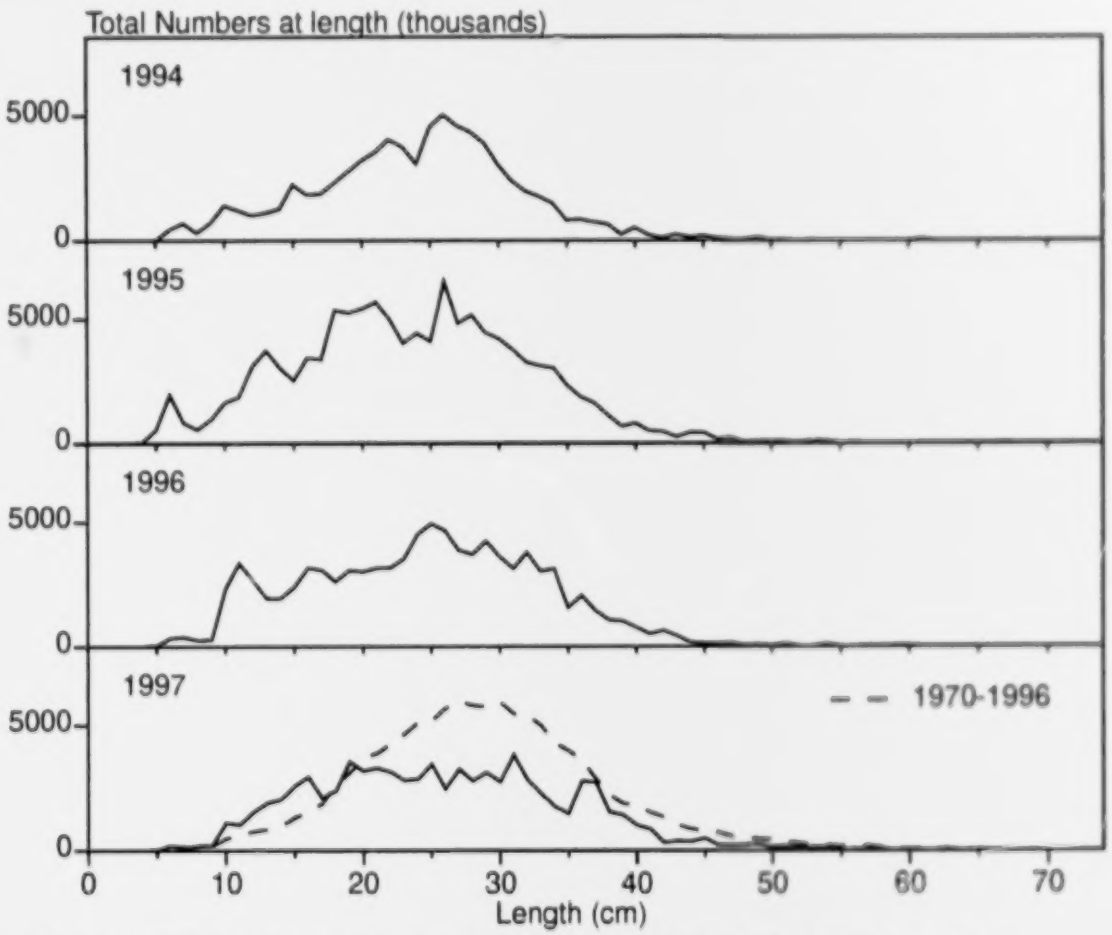


Fig. 34. 4VW Plaice length frequency distribution from the Summer surveys.

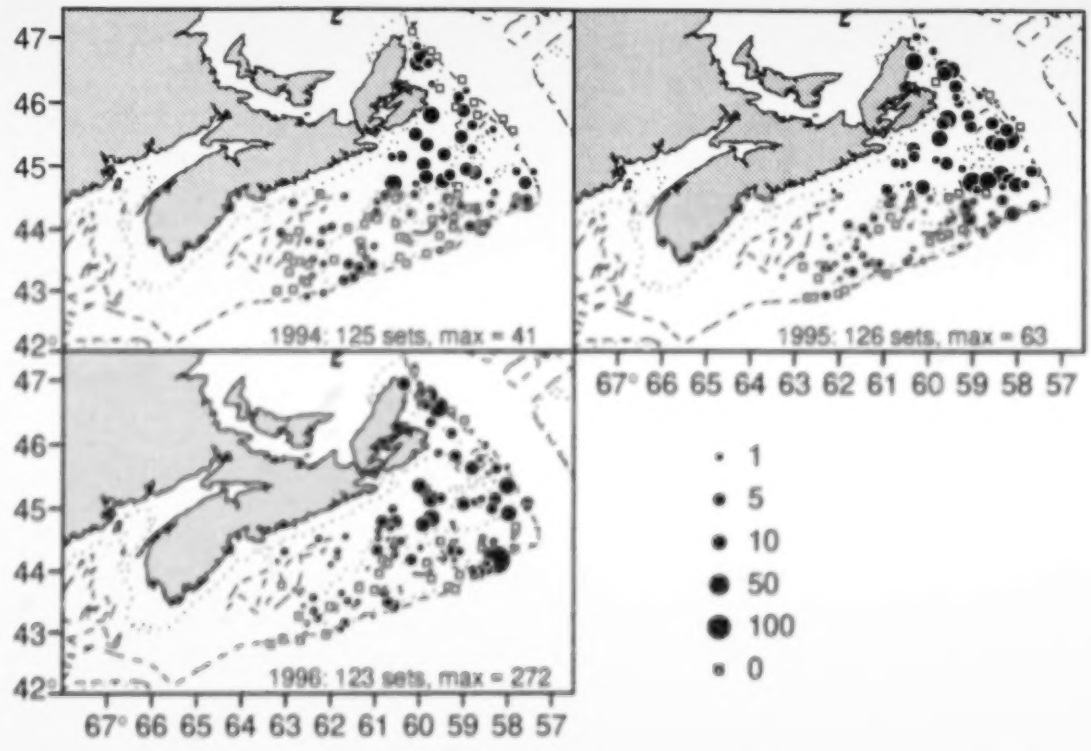


Fig. 35. 4VW Plaice Biomass (kg/tow) from the 1994-1996 Summer Groundfish Survey.

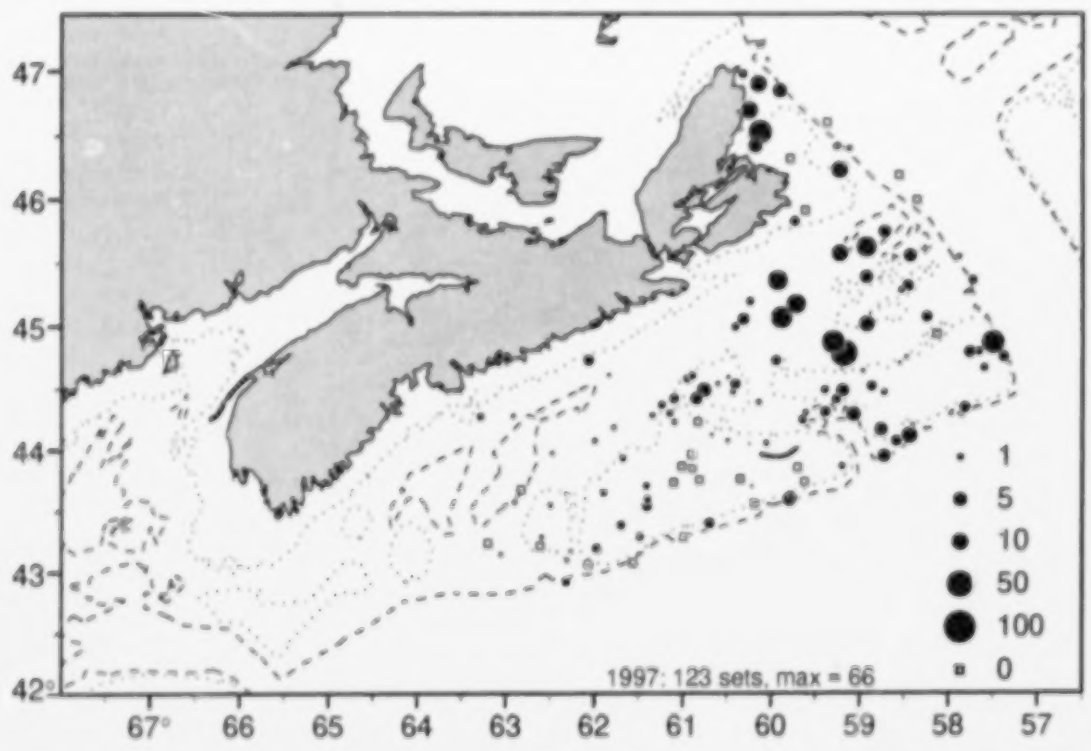


Fig. 36. 4VW Plaice Biomass (kg/tow) from the 1997 Summer Groundfish Survey.

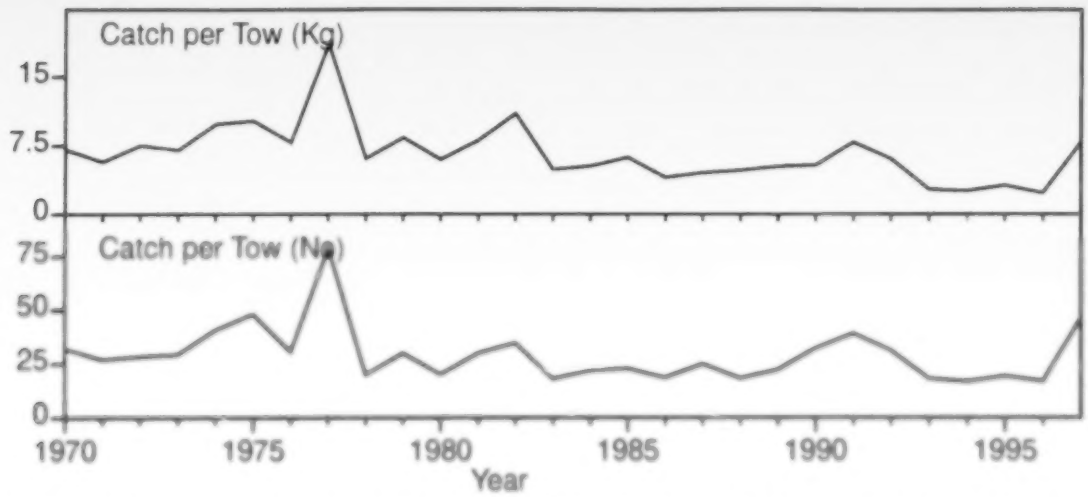


Fig. 37. 4VW Yellowtail Flounder stratified mean Weight and Number caught per tow from the Summer surveys.

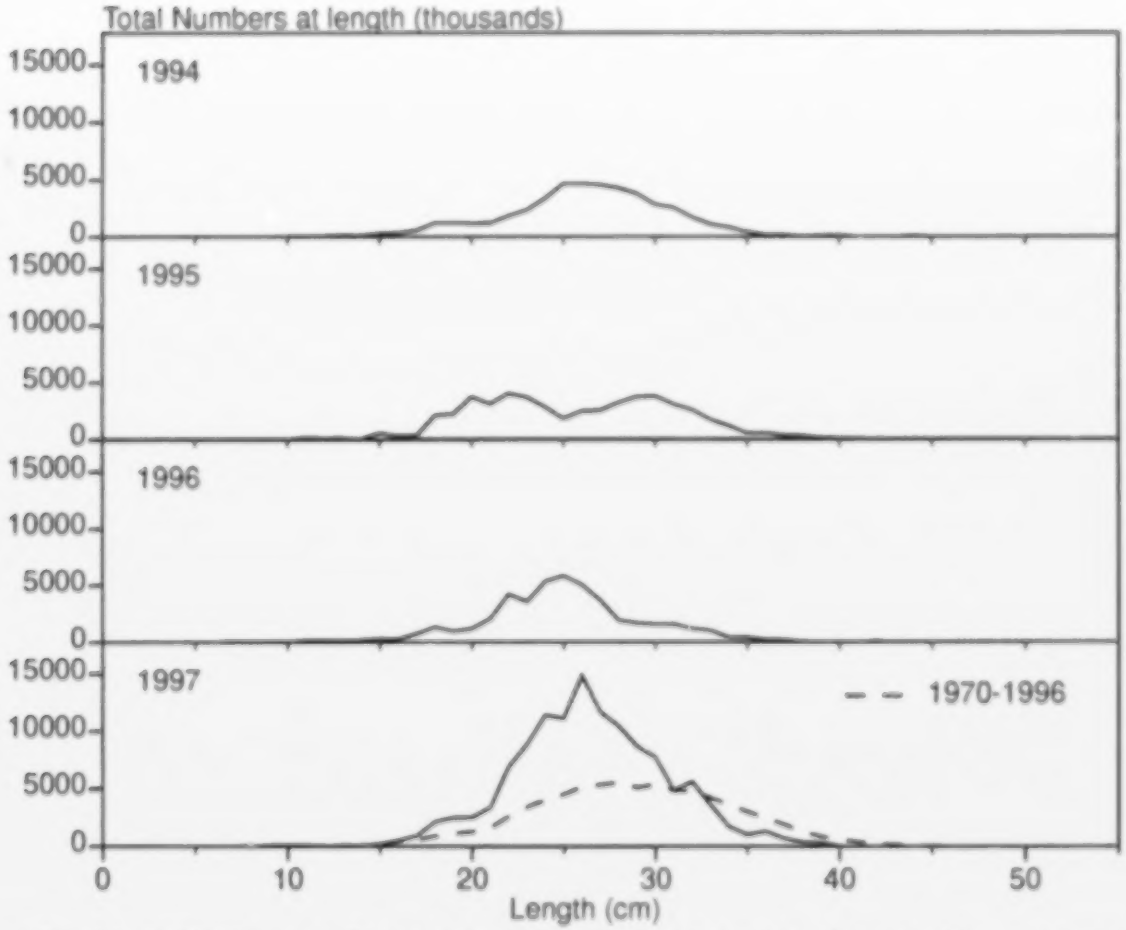


Fig. 38. 4VW Yellowtail Flounder length frequency distribution from the Summer surveys.

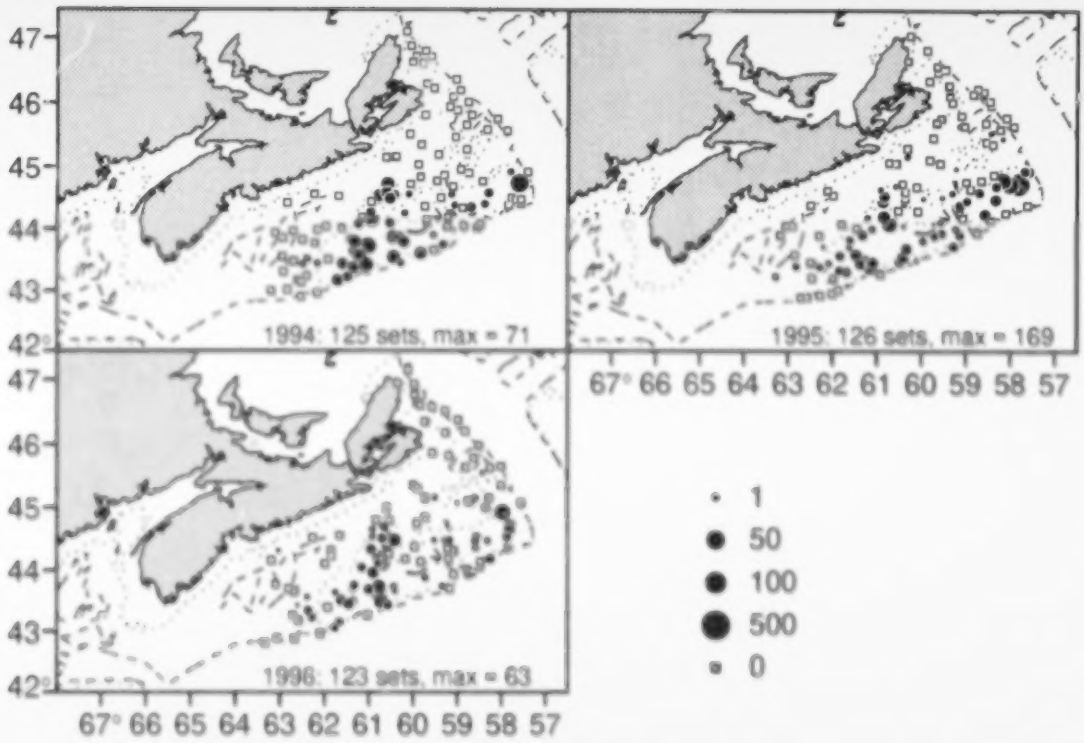


Fig. 39. 4VW Yellowtail Flounder Biomass (kg/tow) from the 1994-1996 Summer Groundfish Surve

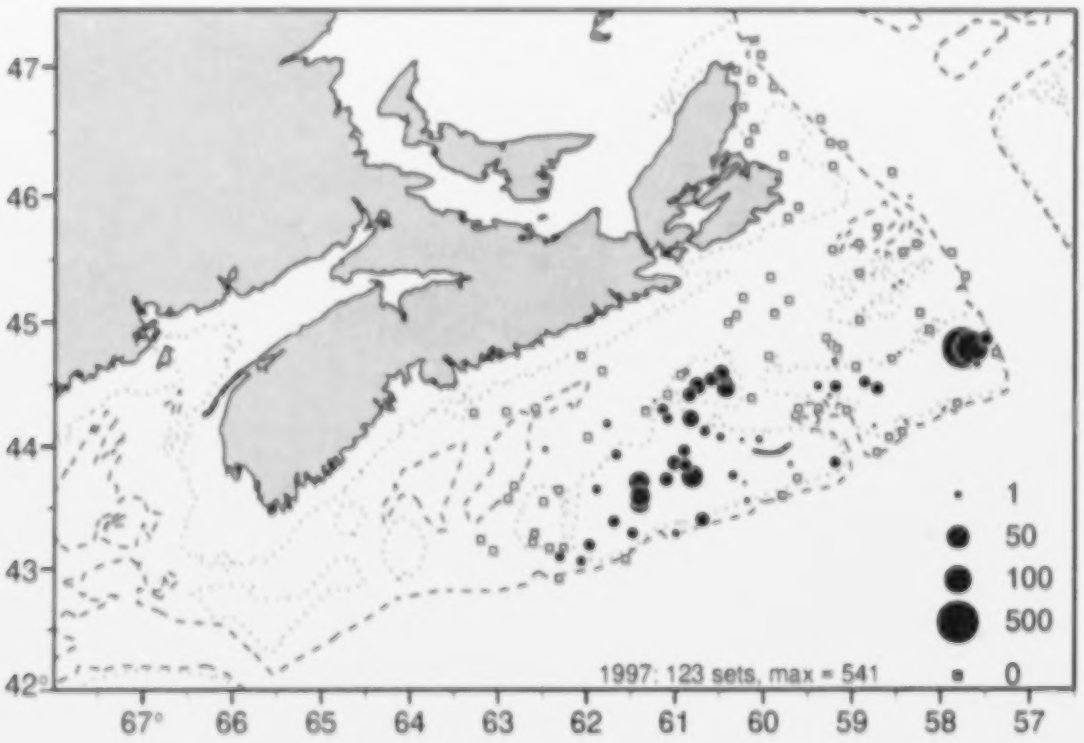


Fig. 40. 4VW Yellowtail Flounder Biomass (kg/tow) from the 1997 Summer Groundfish Survey.

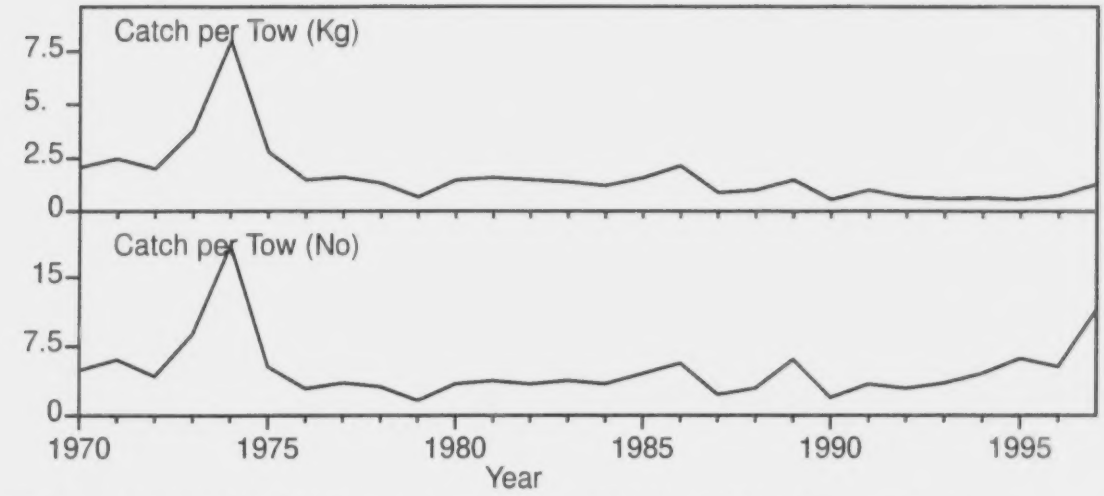


Fig. 41. 4VW Witch Flounder stratified mean Weight and Number caught per tow from the Summer surveys.

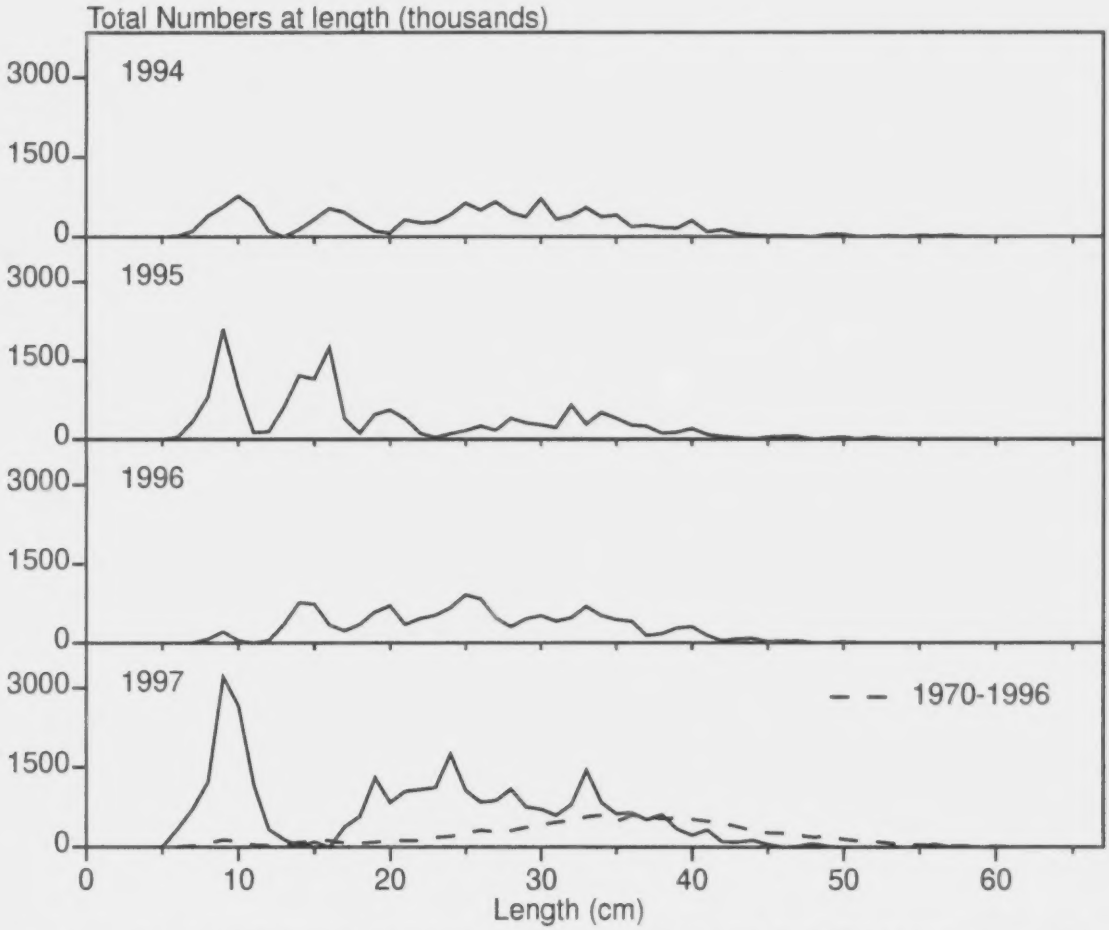


Fig. 42. 4VW Witch Flounder length frequency distribution from the Summer surveys.

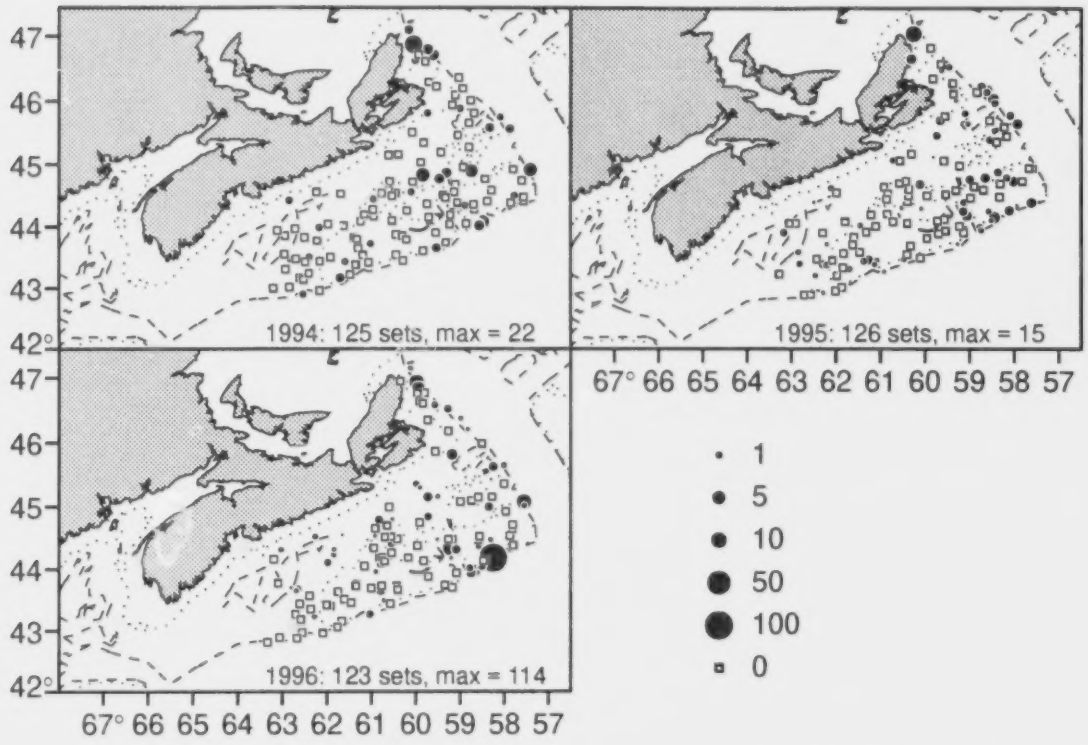


Fig. 43. 4VW Witch Flounder Biomass (kg/tow) from the 1994-1996 Summer Groundfish Survey.

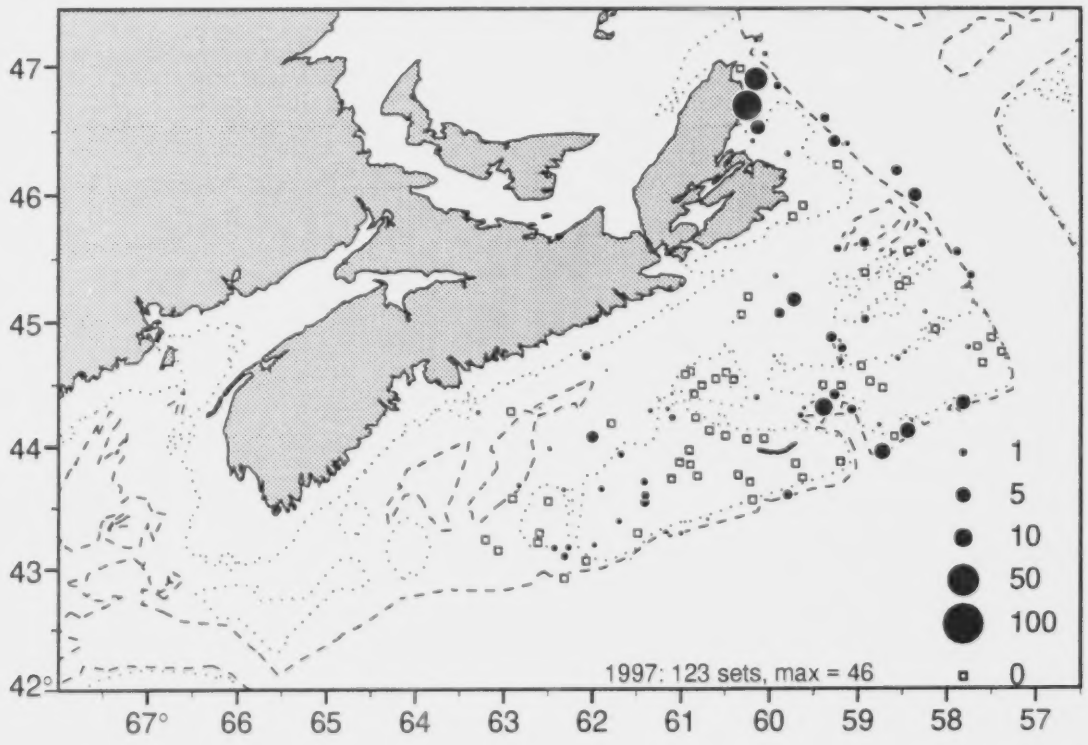


Fig. 44. 4VW Witch Flounder Biomass (kg/tow) from the 1997 Summer Groundfish Survey.

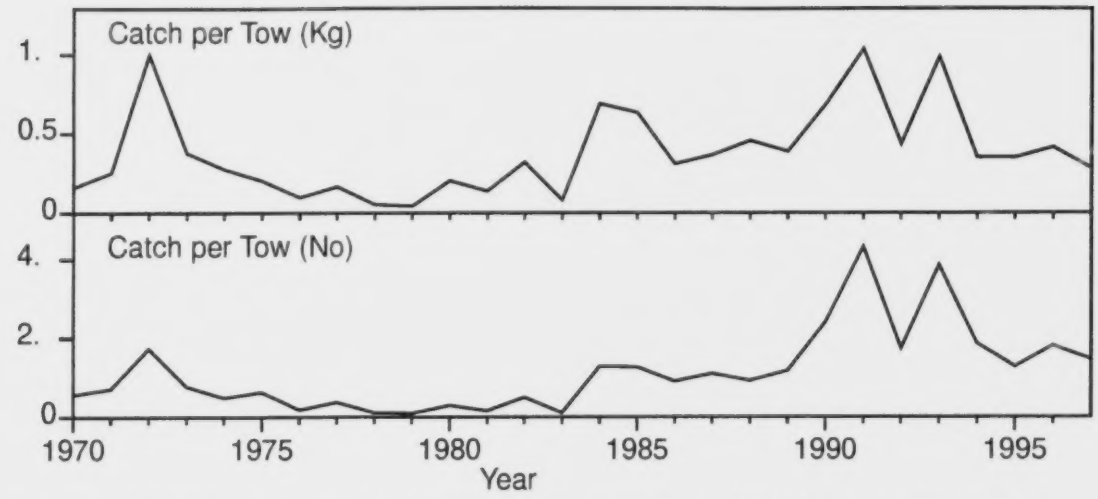


Fig. 45. 4VW Winter Flounder stratified mean Weight and Number caught per tow from the Summer surveys.

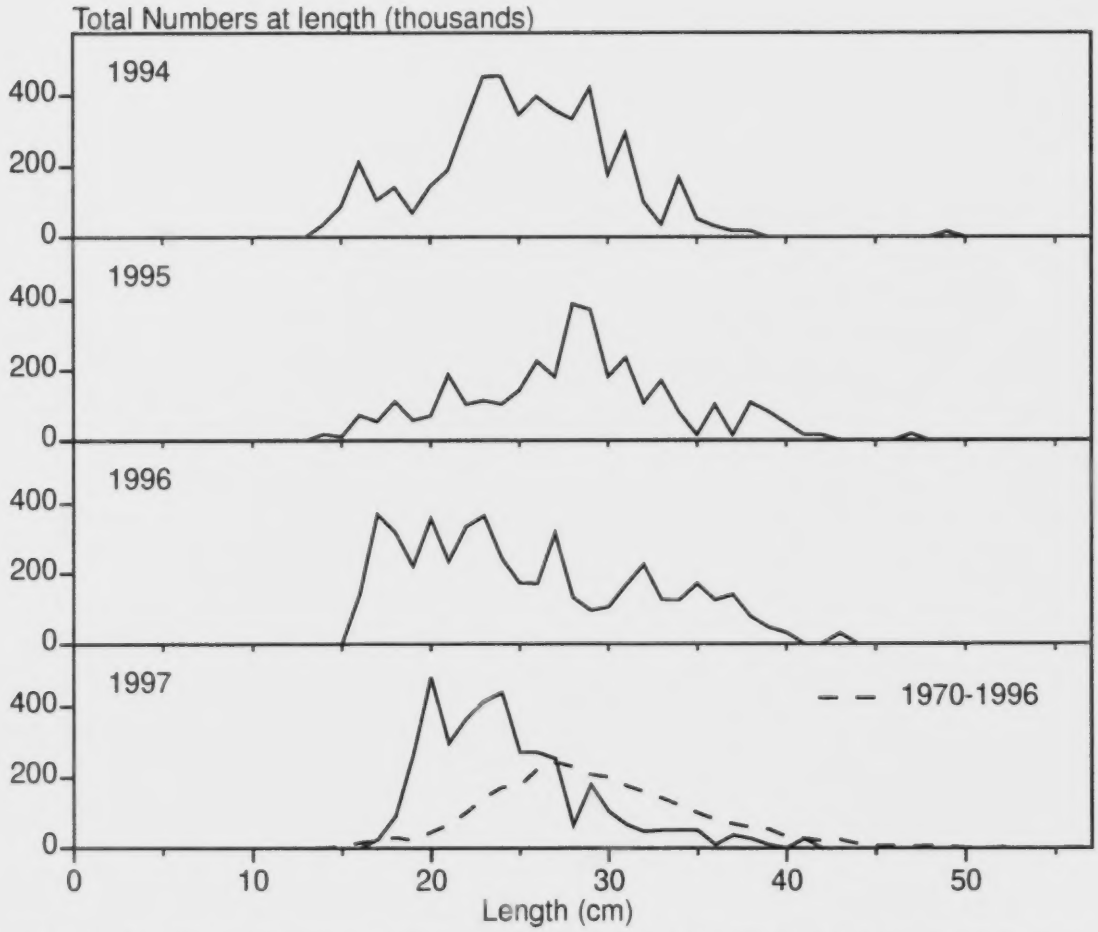


Fig. 46. 4VW Winter Flounder length frequency distribution from the Summer surveys.

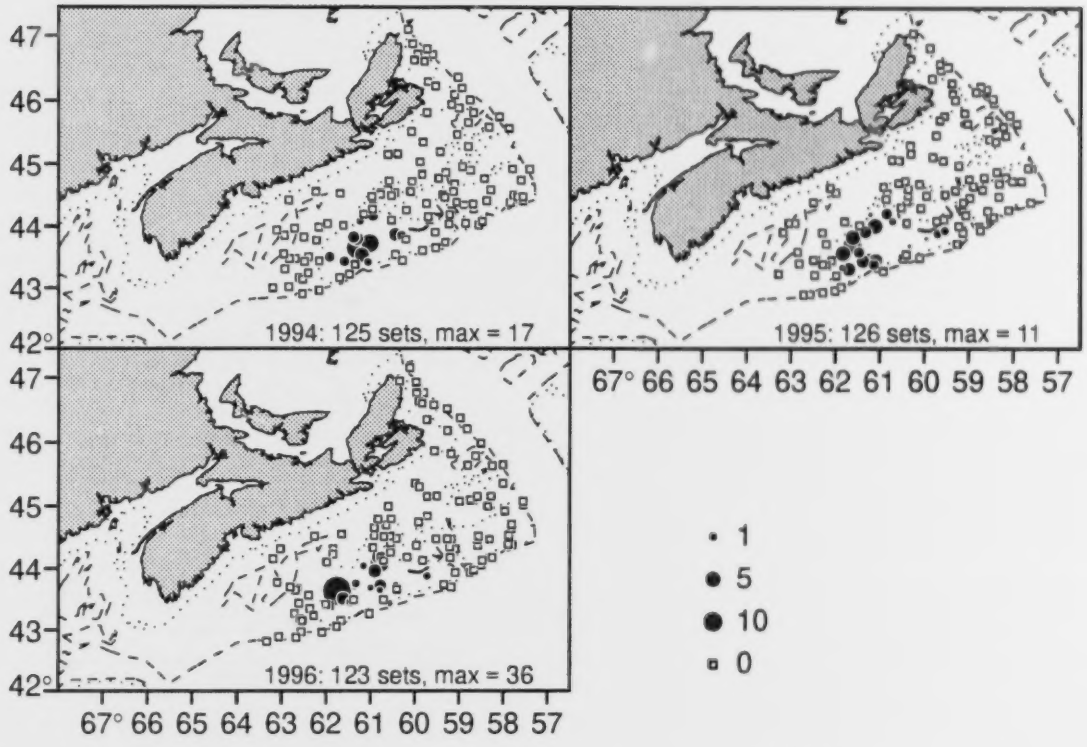


Fig. 47. 4VW Winter Flounder Biomass (kg/tow) from the 1994-1996 Summer Groundfish Survey.

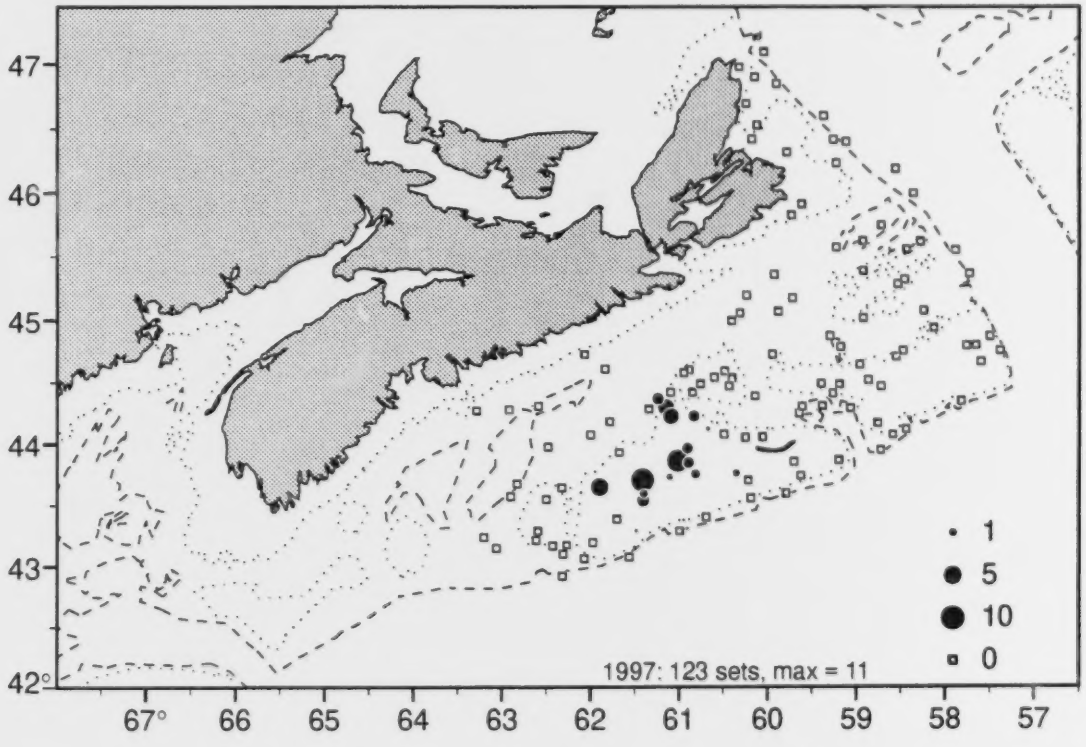


Fig. 48. 4VW Winter Flounder Biomass (kg/tow) from the 1997 Summer Groundfish Survey.

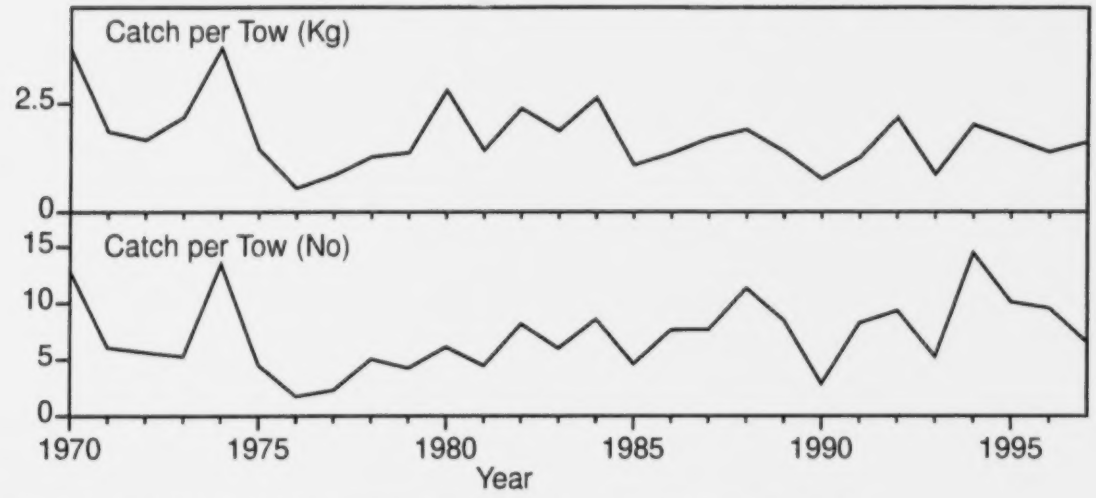


Fig. 49. 4X Plaice stratified mean Weight and Number caught per tow from the Summer surveys.

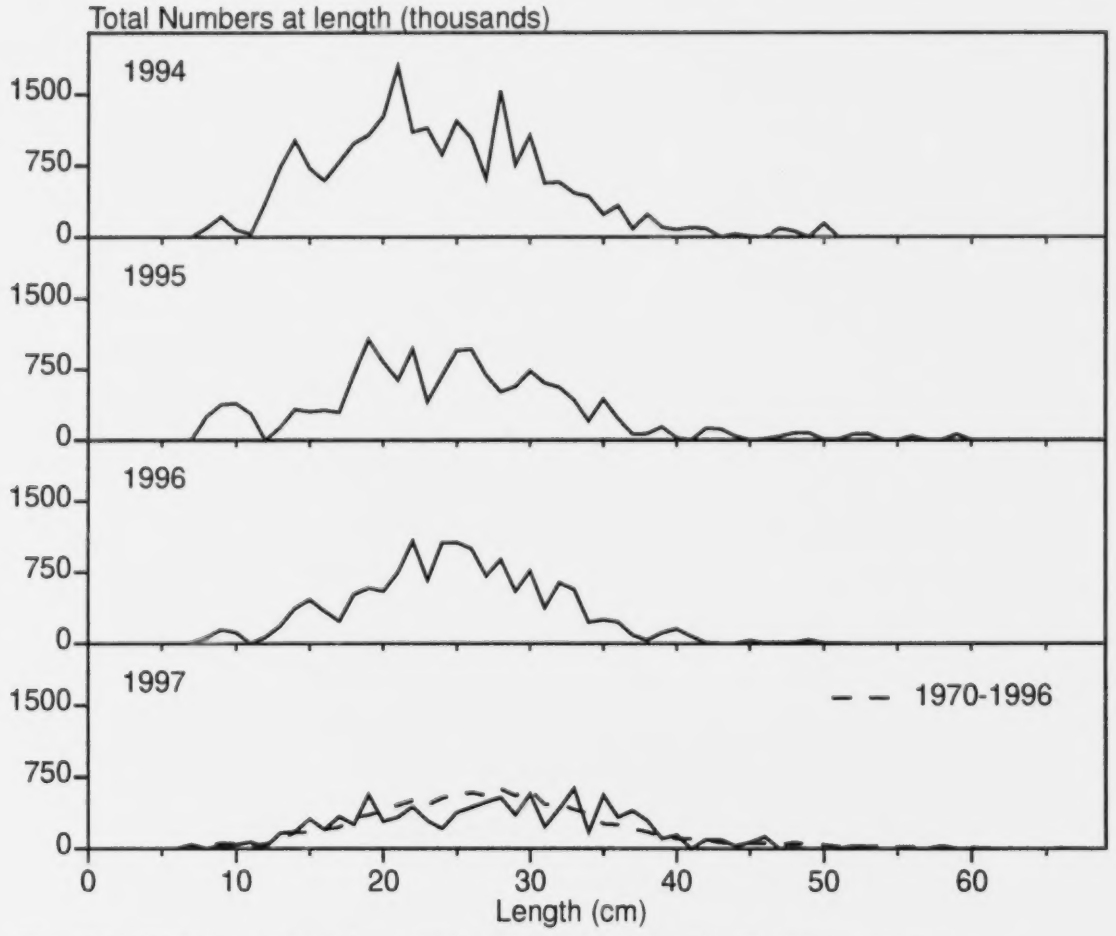


Fig. 50. 4X Plaice length frequency distribution from the Summer surveys.

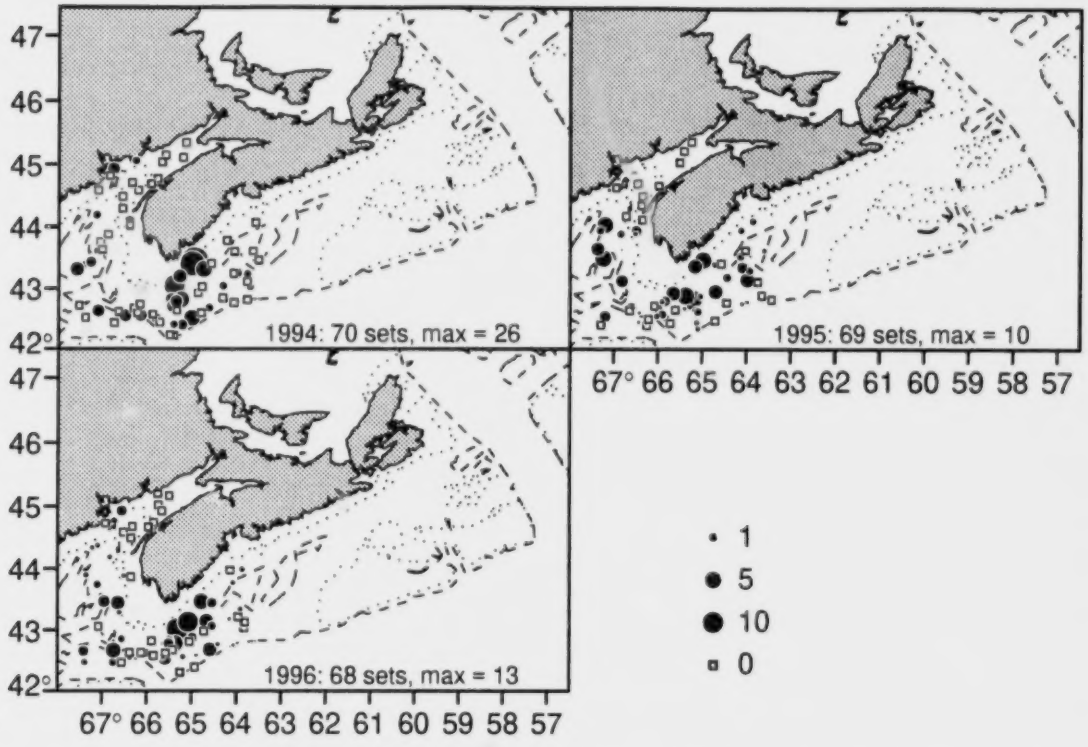


Fig. 51. 4X Plaice Biomass (kg/tow) from the 1994-1996 Summer Groundfish Survey.

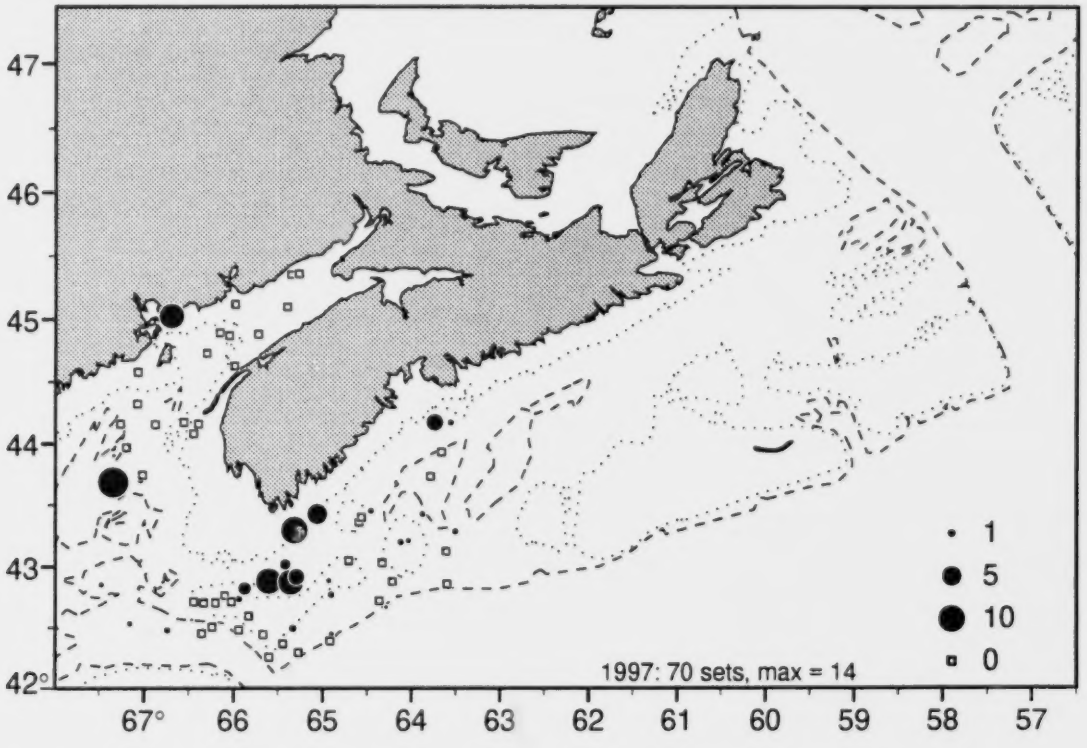


Fig. 52. 4X Plaice Biomass (kg/tow) from the 1997 Summer Groundfish Survey.

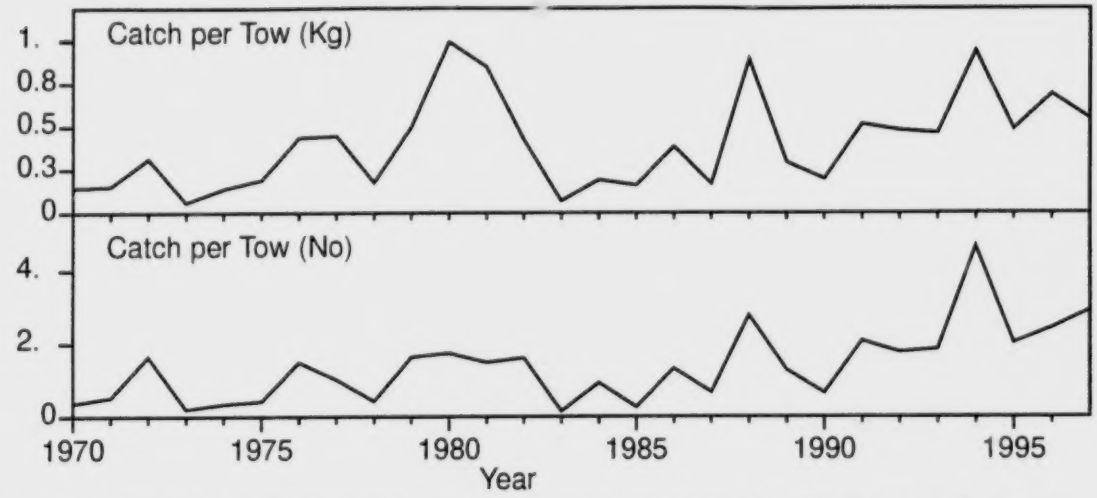


Fig. 53. 4X Yellowtail Flounder stratified mean Weight and Number caught per tow from the Summer surveys.

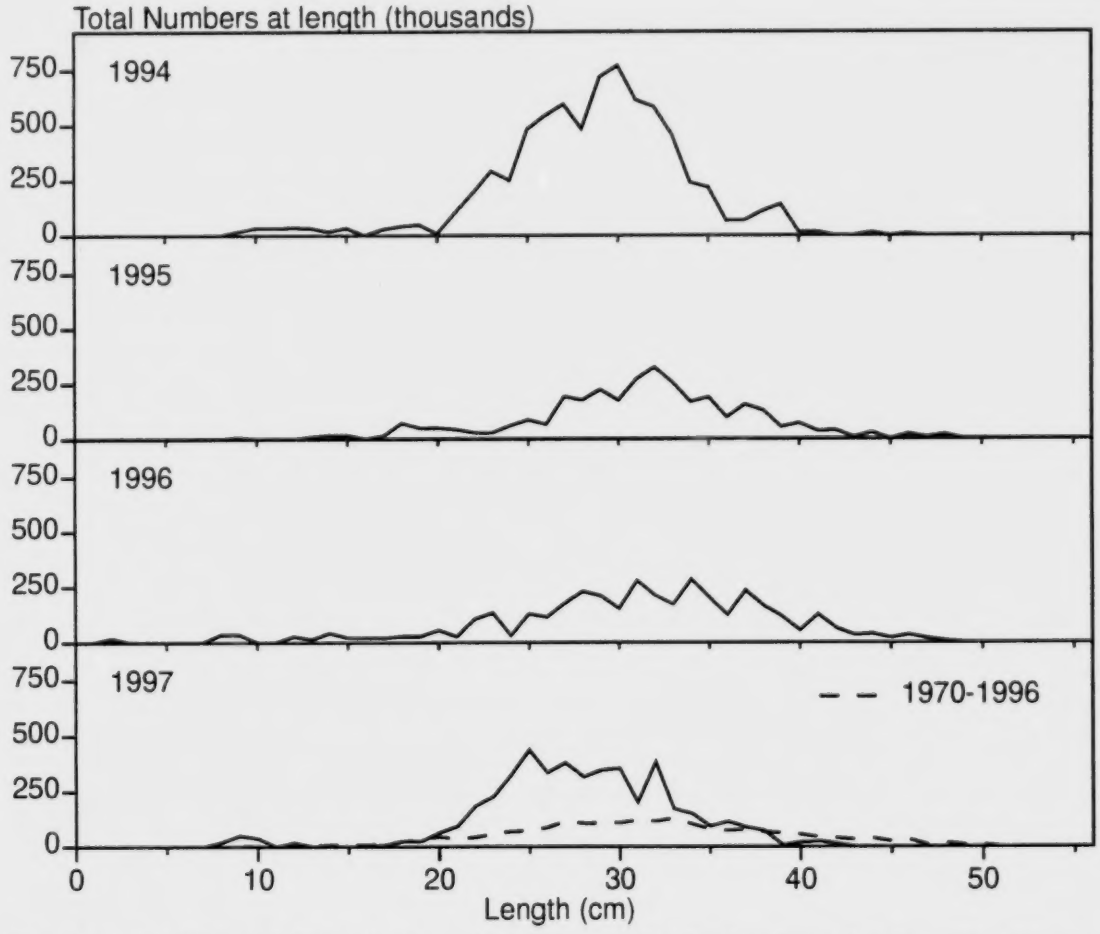


Fig. 54. 4X Yellowtail Flounder length frequency distribution from the Summer surveys.

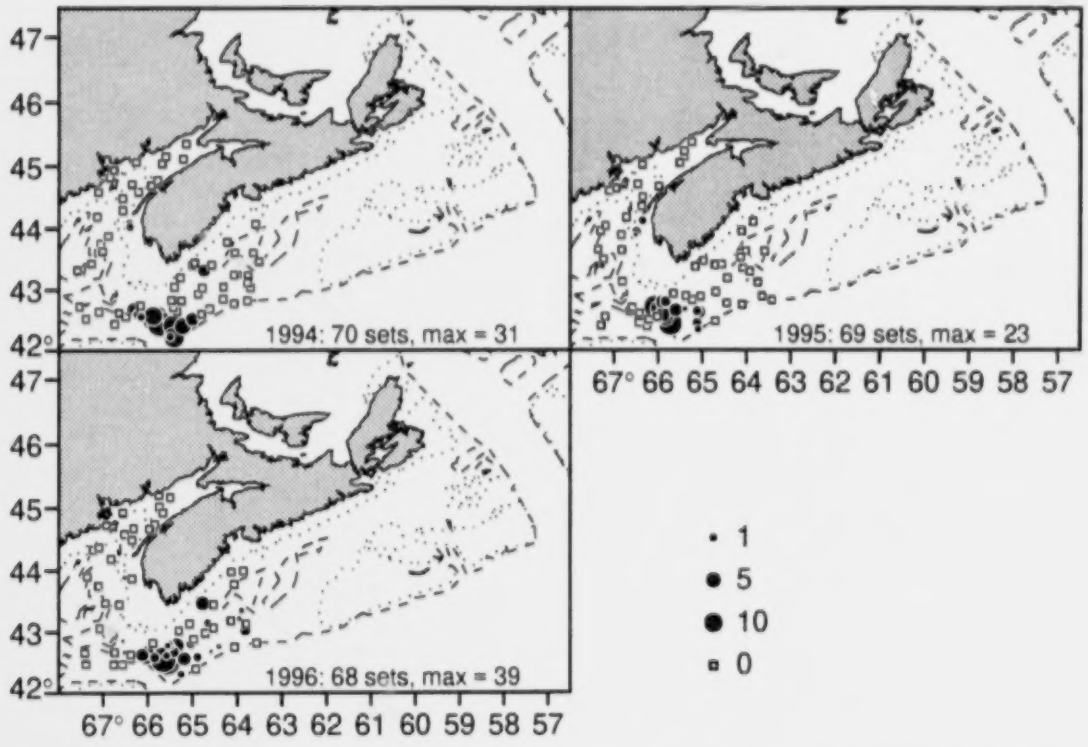


Fig. 55. 4X Yellowtail Flounder Biomass (kg/tow) from the 1994-1996 Summer Groundfish Survey.

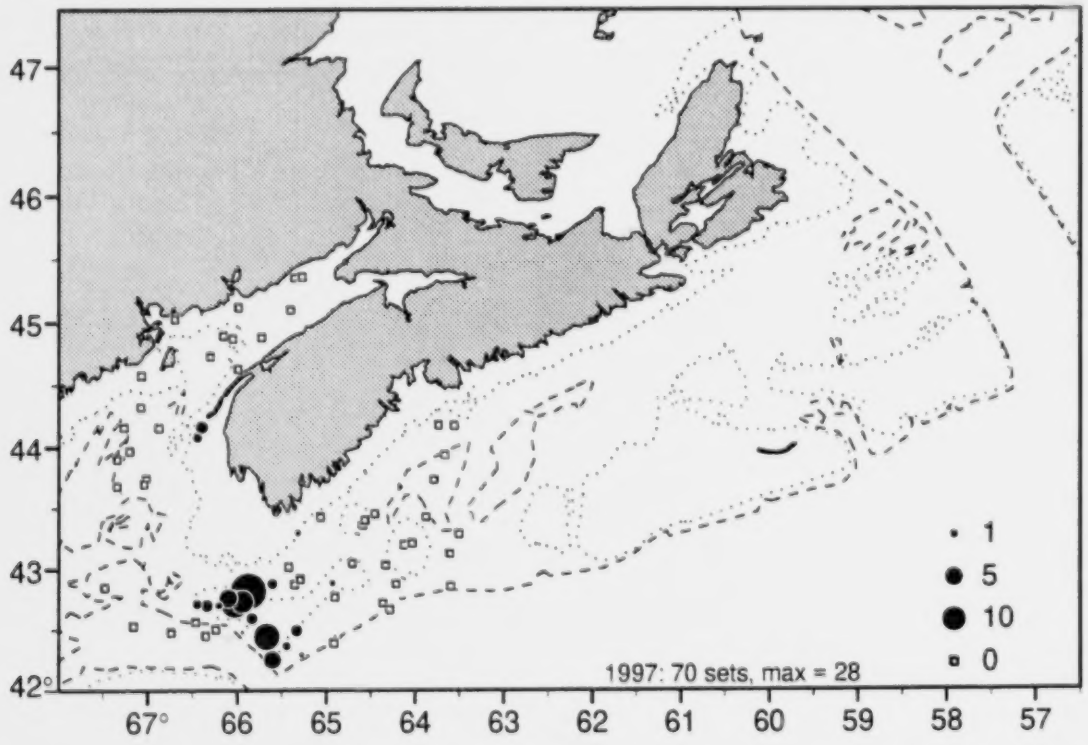


Fig. 56. 4X Yellowtail Flounder Biomass (kg/tow) from the 1997 Summer Groundfish Survey.

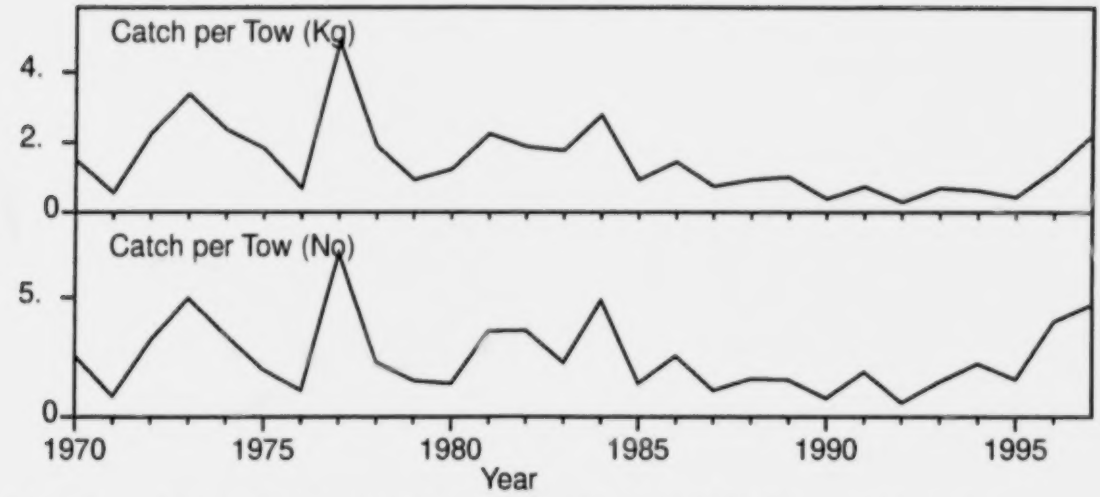


Fig. 57. 4X Witch Flounder stratified mean Weight and Number caught per tow from the Summer surveys.

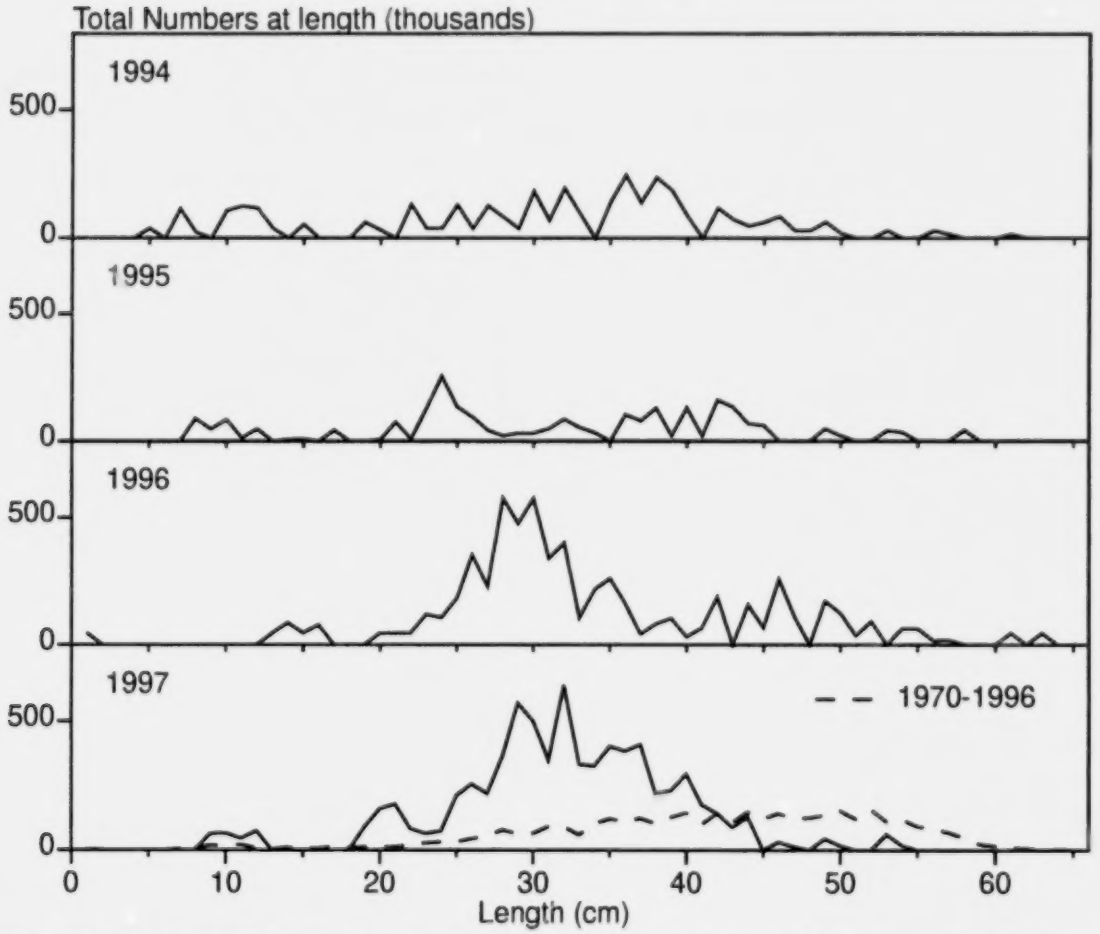


Fig. 58. 4X Witch Flounder length frequency distribution from the Summer surveys.

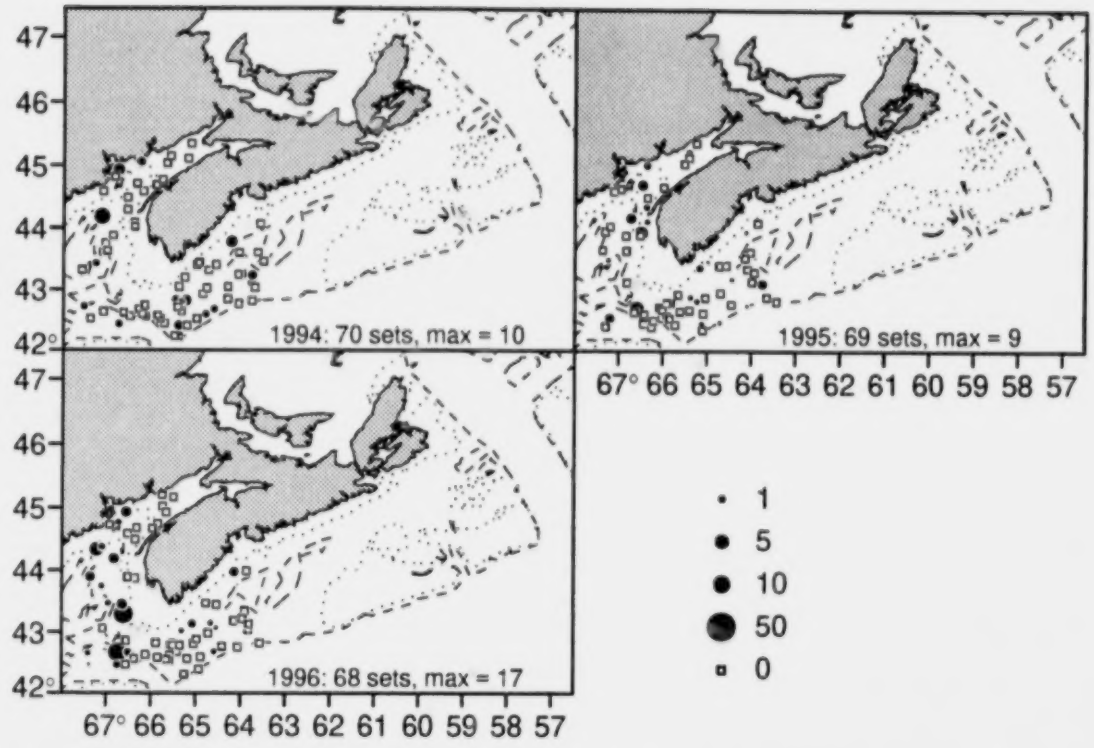


Fig. 59. 4X Witch Flounder Biomass (kg/tow) from the 1994-1996 Summer Groundfish Survey.

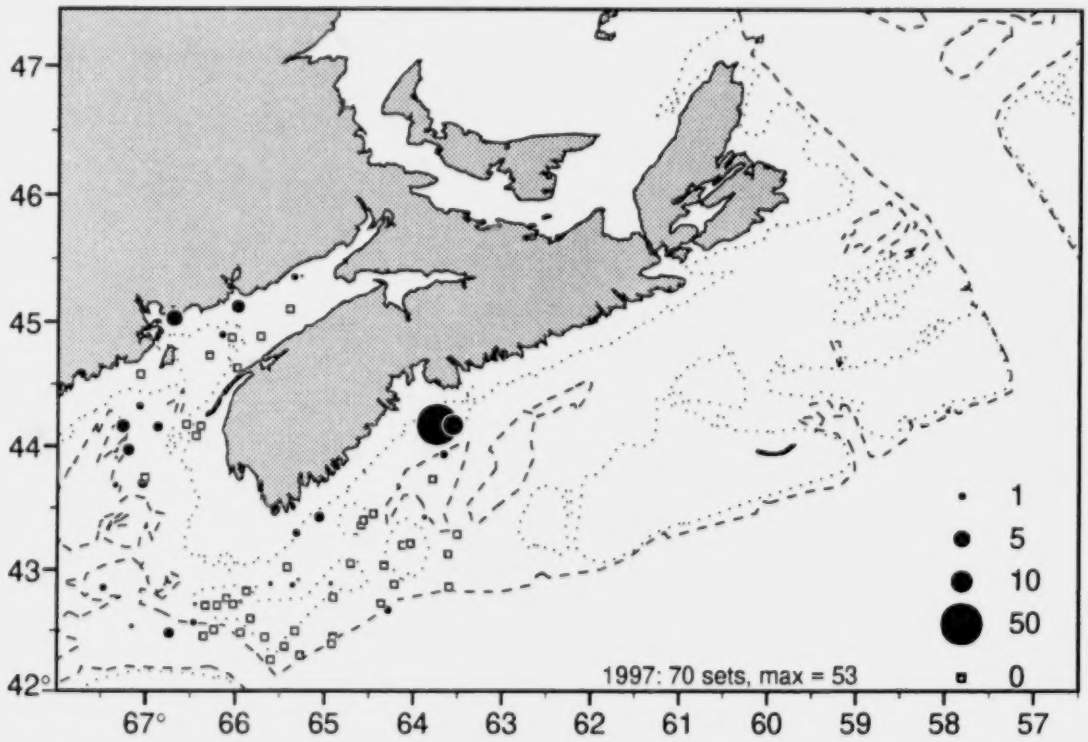


Fig. 60. 4X Witch Flounder Biomass (kg/tow) from the 1997 Summer Groundfish Survey.

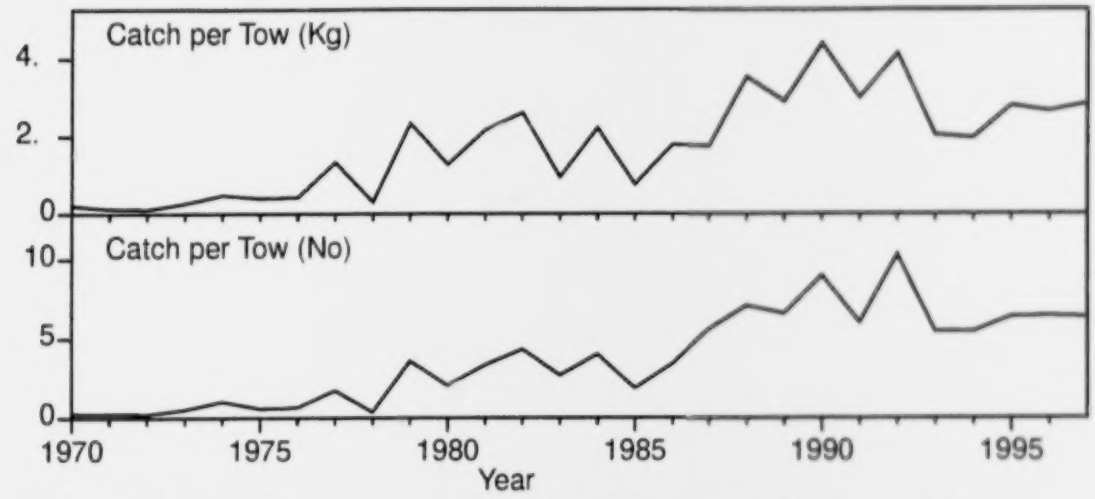


Fig. 61. 4X Winter Flounder stratified mean Weight and Number caught per tow from the Summer surveys.

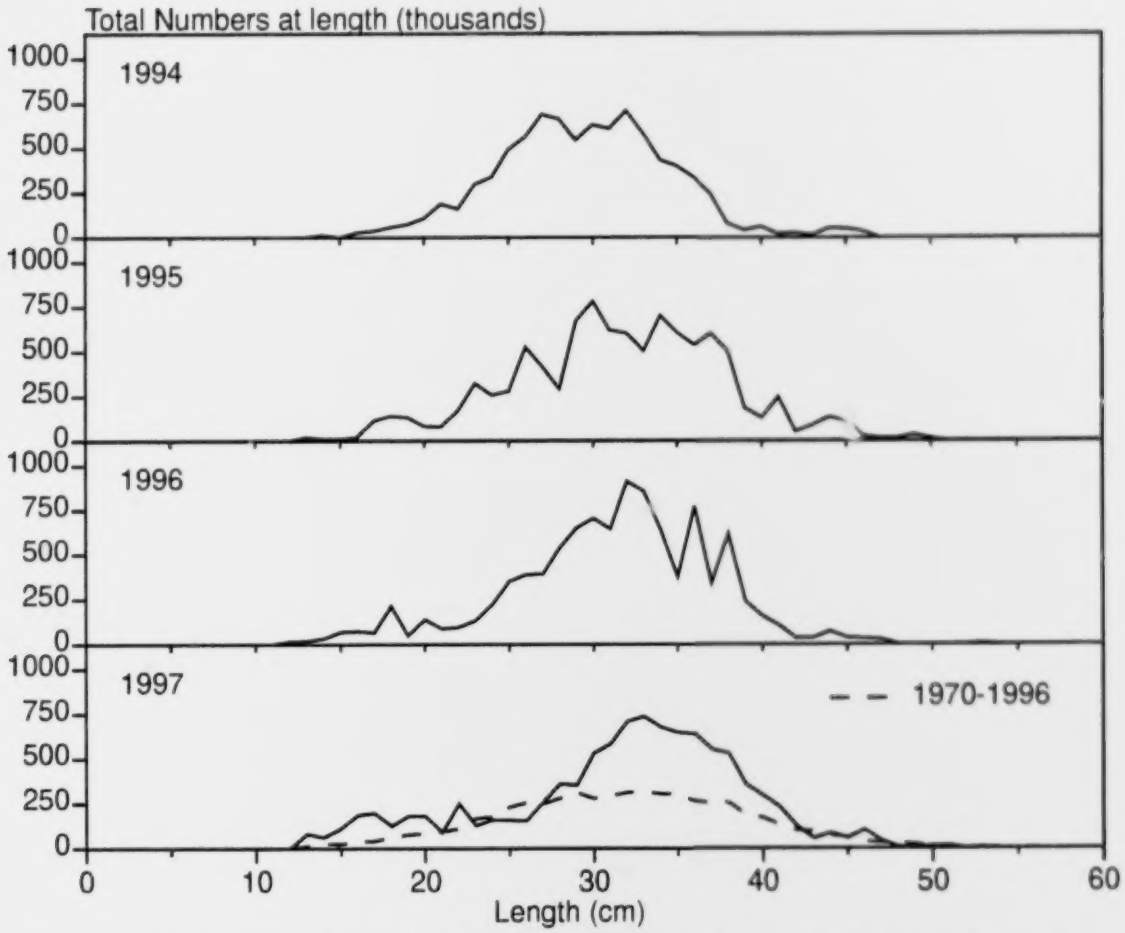


Fig. 62. 4X Winter Flounder length frequency distribution from the Summer surveys.

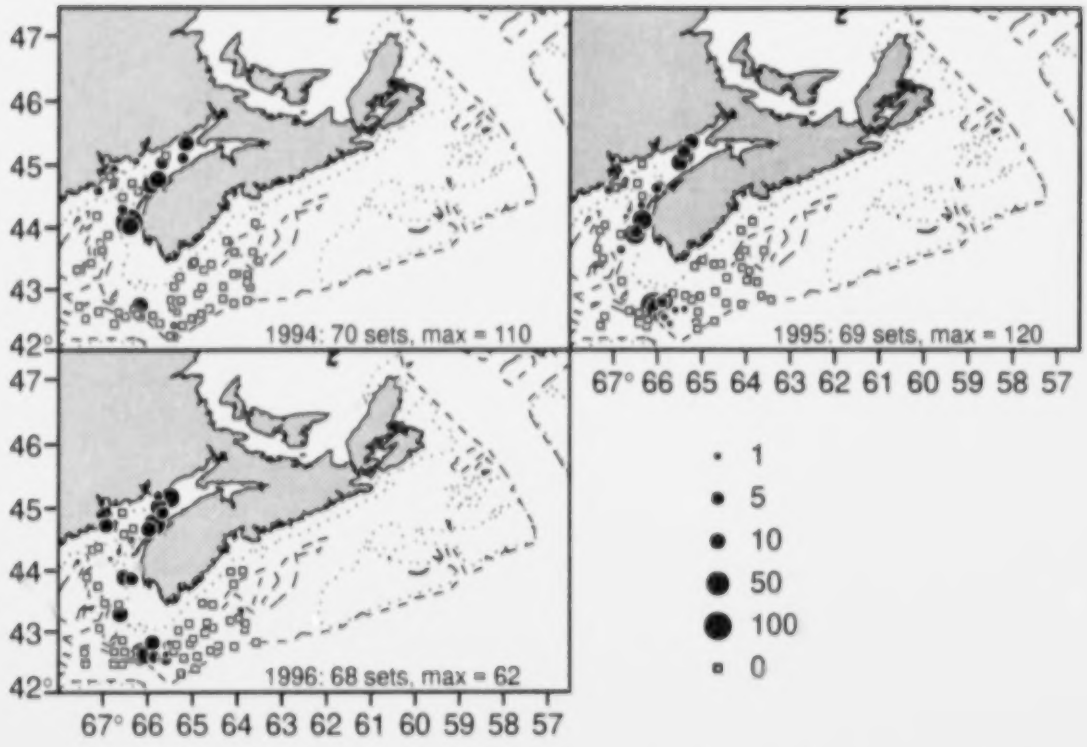


Fig. 63. 4X Winter Flounder Biomass (kg/tow) from the 1994-1996 Summer Groundfish Survey.

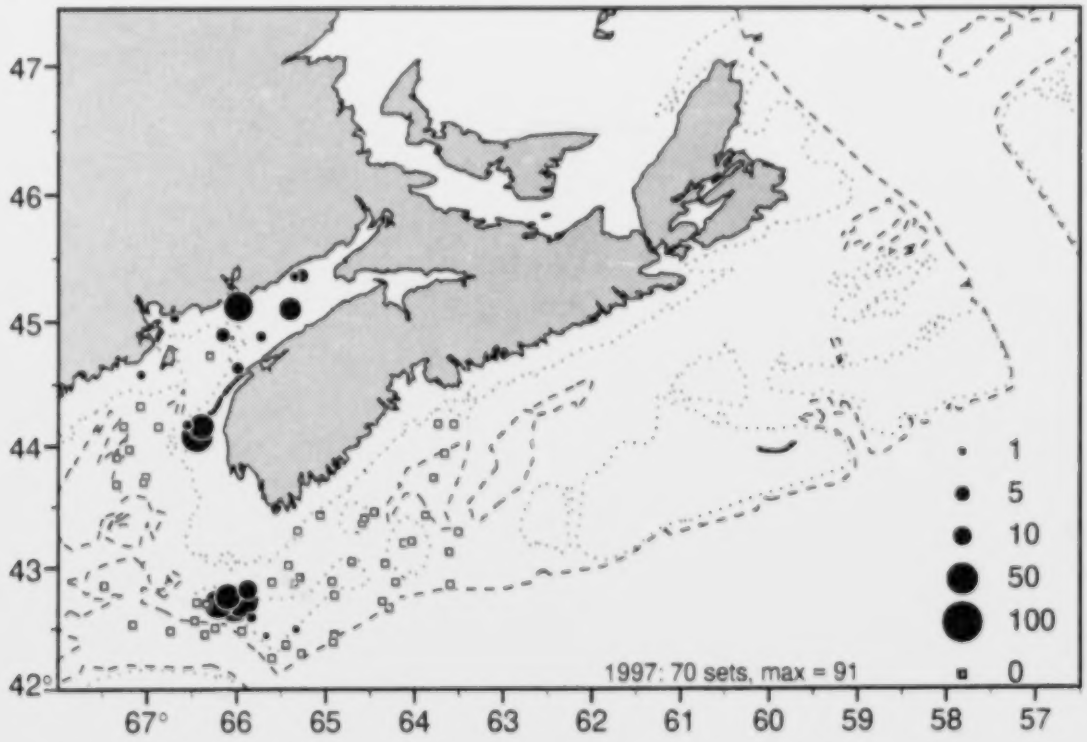


Fig. 64. 4X Winter Flounder Biomass (kg/tow) from the 1997 Summer Groundfish Survey.

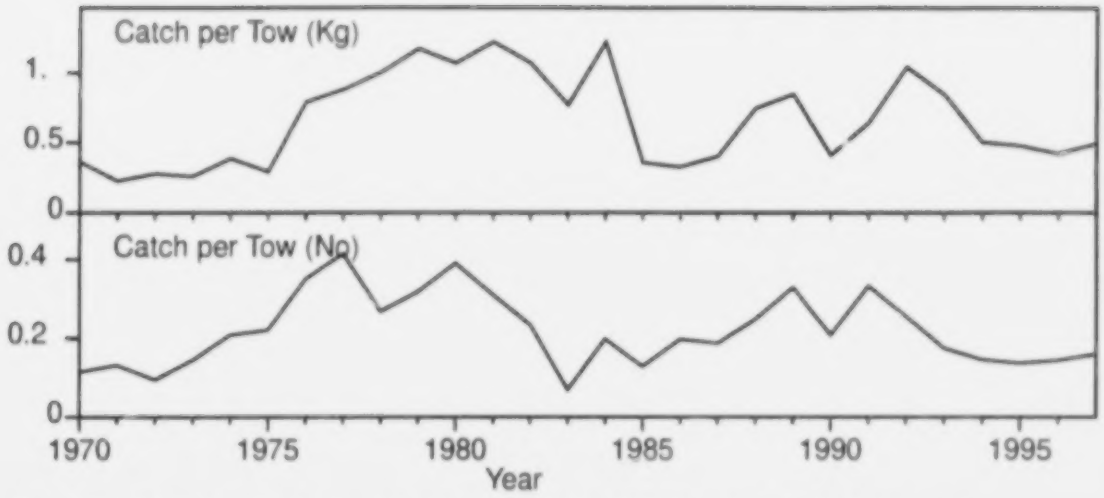


Fig. 65. 4VWX Halibut stratified mean Weight and Number caught per tow from the Summer surveys.

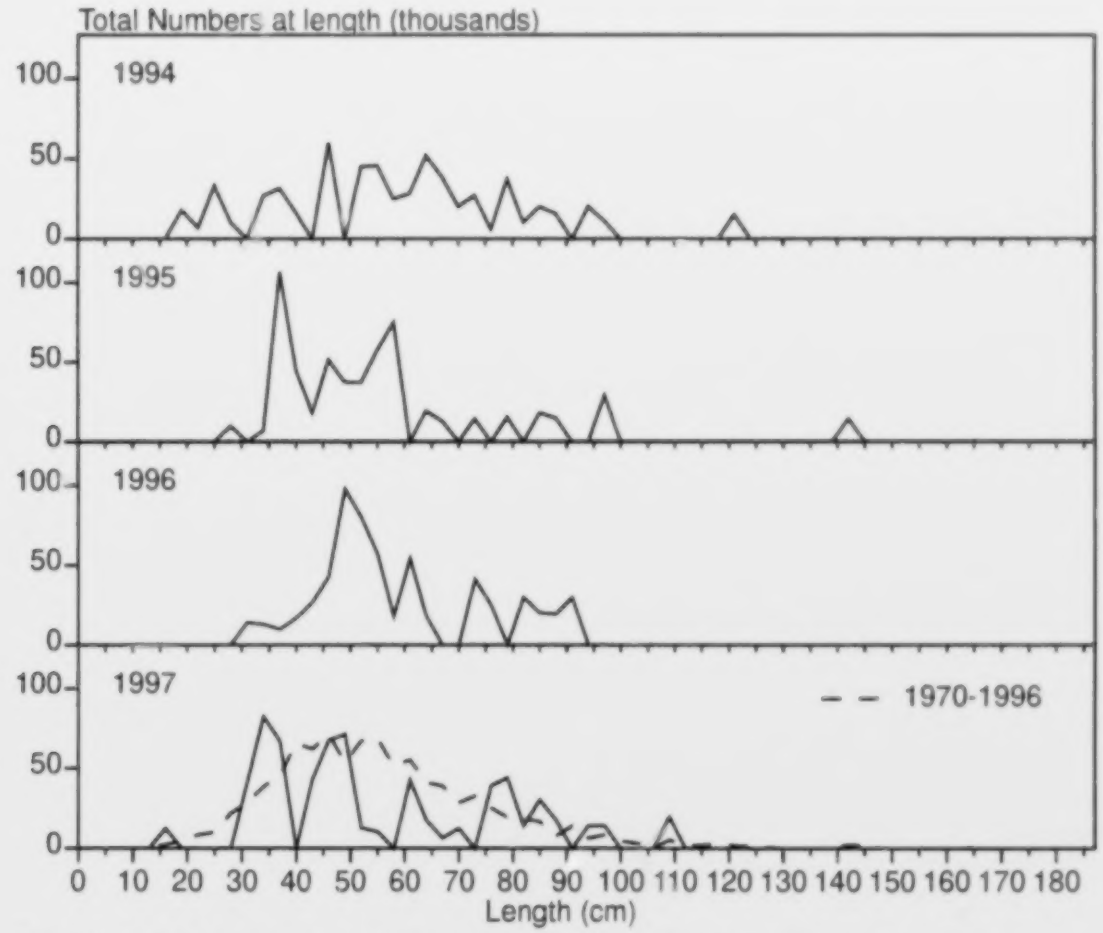


Fig. 66. 4VWX Halibut length frequency distribution from the Summer surveys.

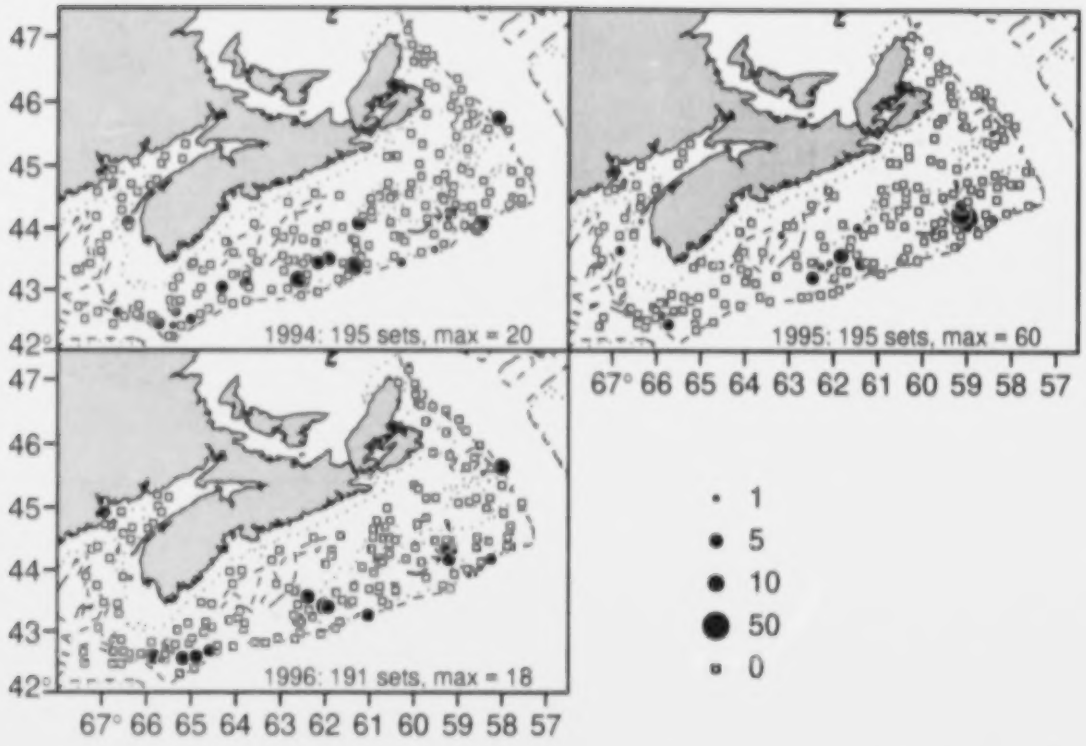


Fig. 67. 4VWX Halibut Biomass (kg/tow) from the 1994-1996 Summer Groundfish Survey.

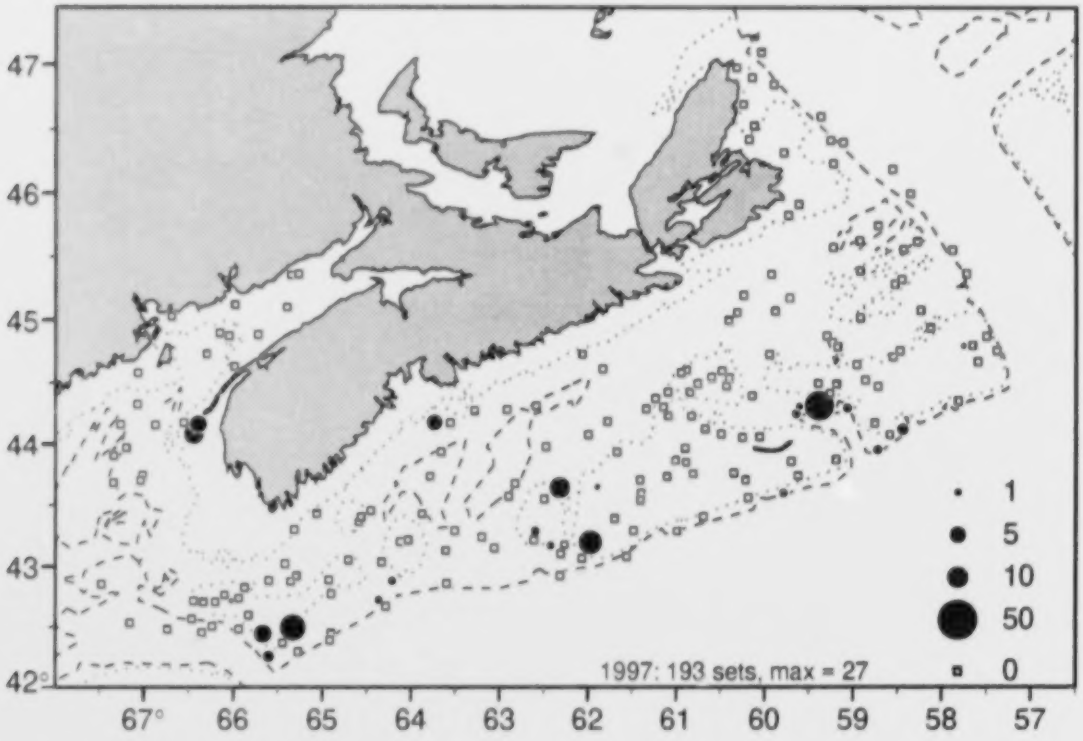


Fig. 68. 4VWX Halibut Biomass (kg/tow) from the 1997 Summer Groundfish Survey.

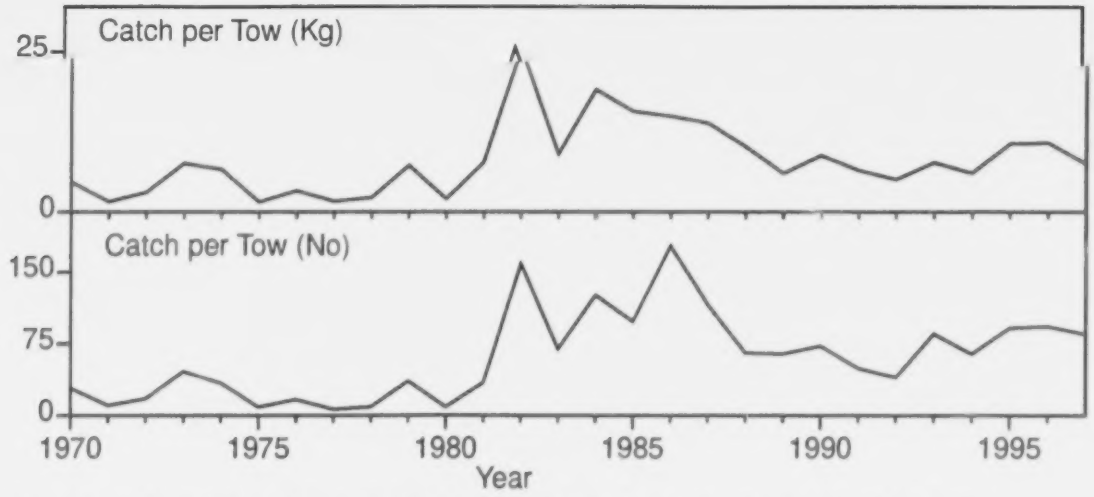


Fig. 69. 4VWX Silver Hake stratified mean Weight and Number caught per tow from the Summer surveys.

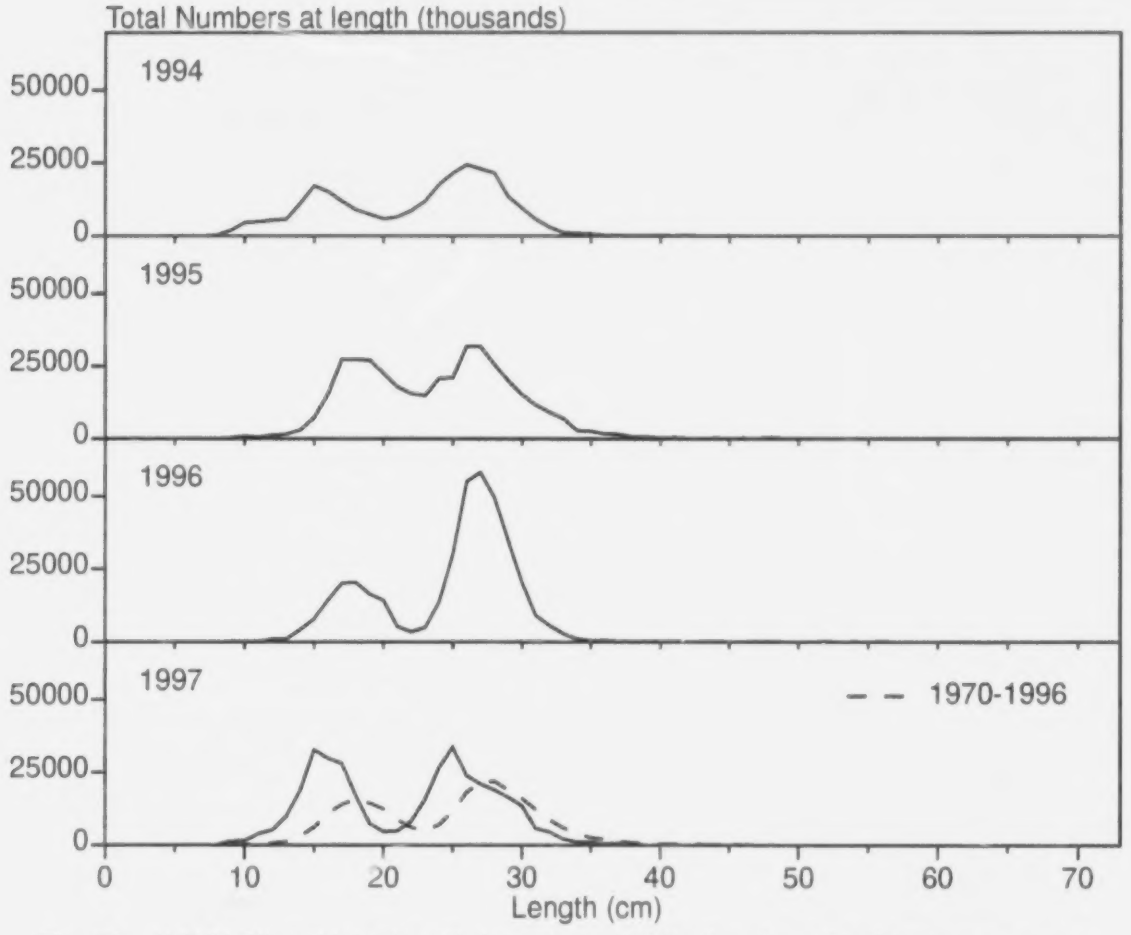


Fig. 70. 4VWX Silver Hake length frequency distribution from the Summer surveys.

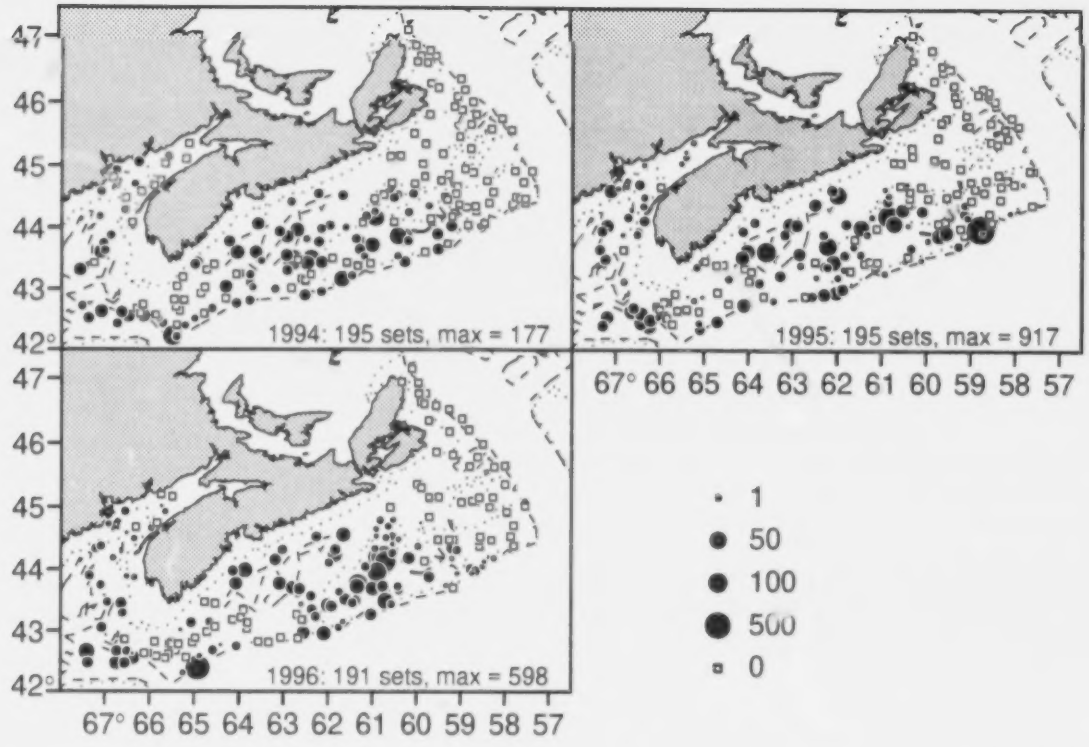


Fig. 71. 4VWX Silver Hake Biomass (kg/tow) from the 1994-1996 Summer Groundfish Survey.

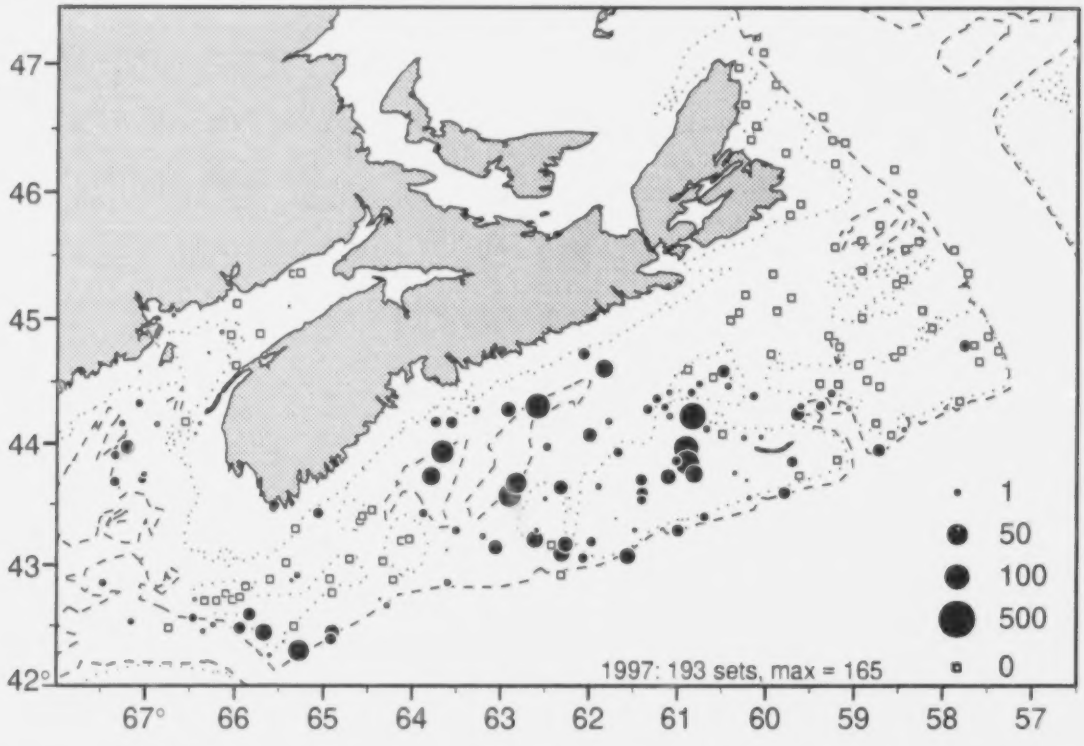


Fig. 72. 4VWX Silver Hake Biomass (kg/tow) from the 1997 Summer Groundfish Survey.

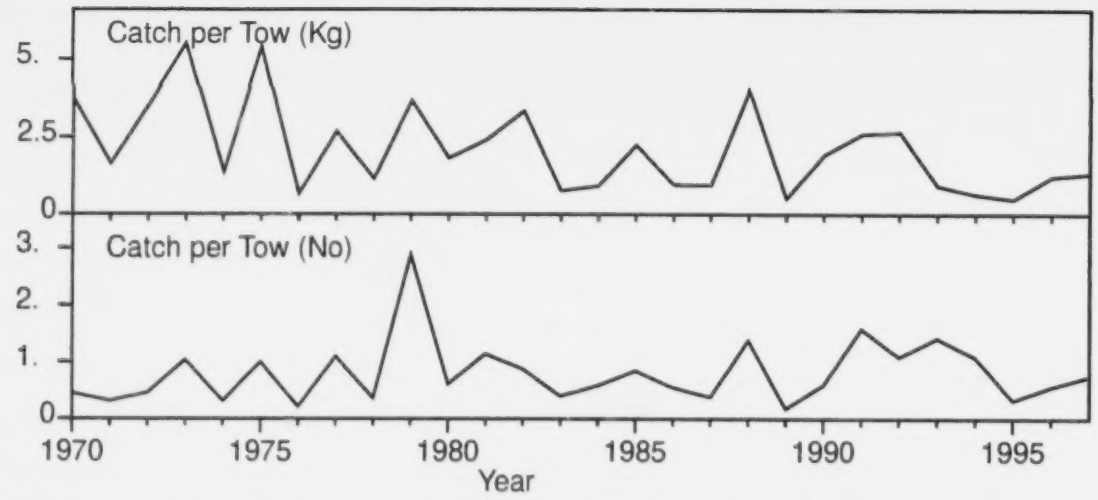


Fig. 73. 4VsW Winter Skate stratified mean Weight and Number caught per tow from the Summer surveys.

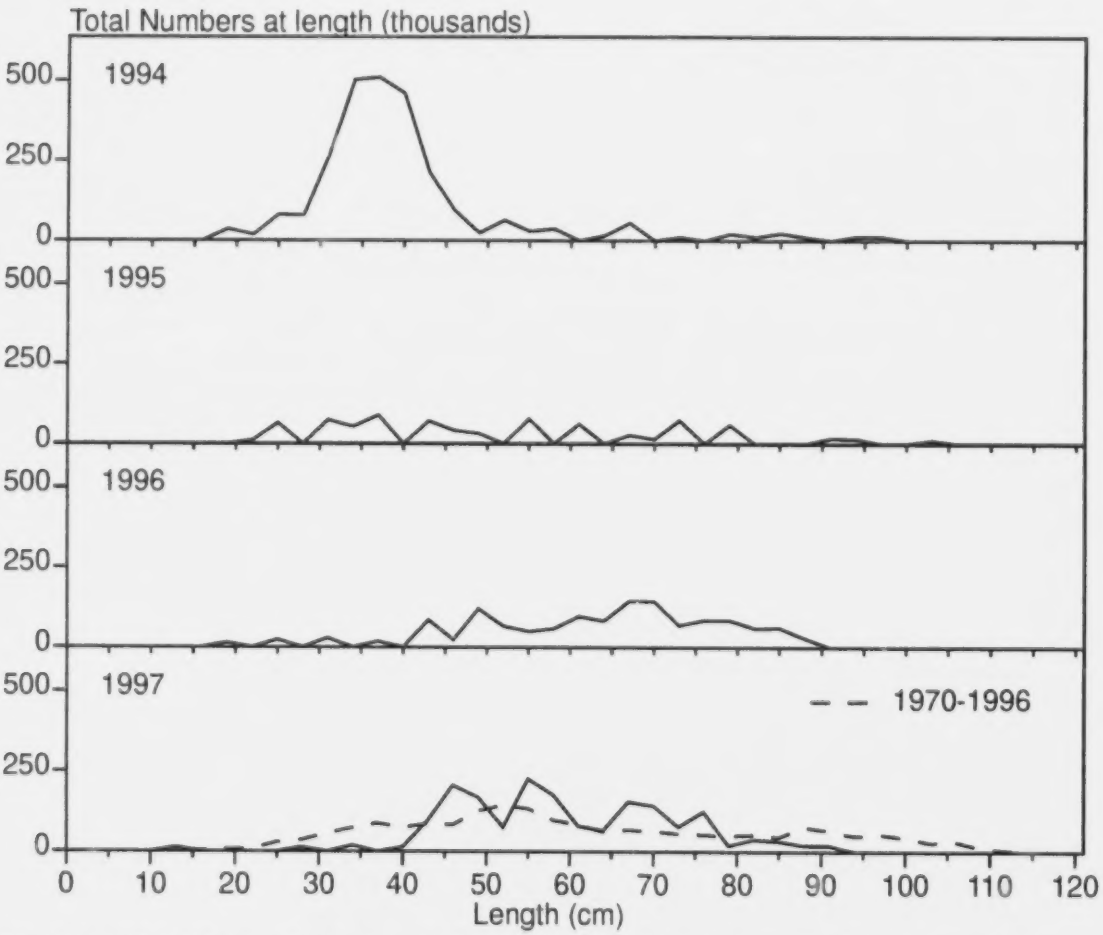


Fig. 74. 4VsW Winter Skate length frequency distribution from the Summer surveys.

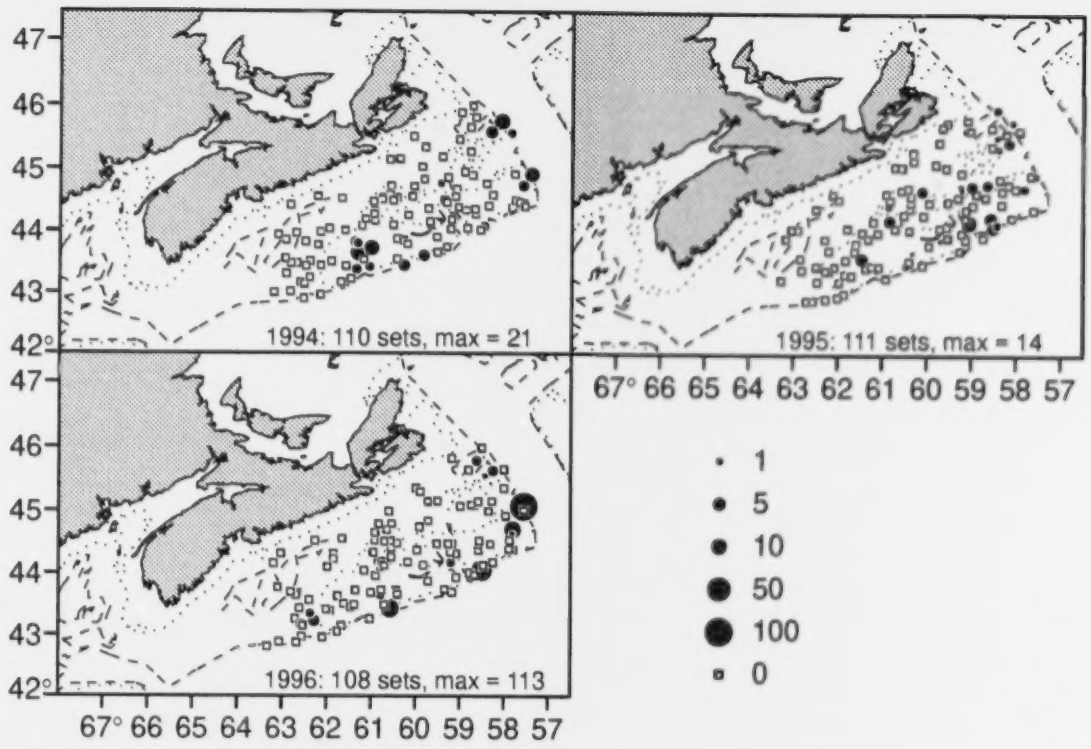


Fig. 75. 4VsW Winter Skate Biomass (kg/tow) from the 1994-1996 Summer Groundfish Survey.

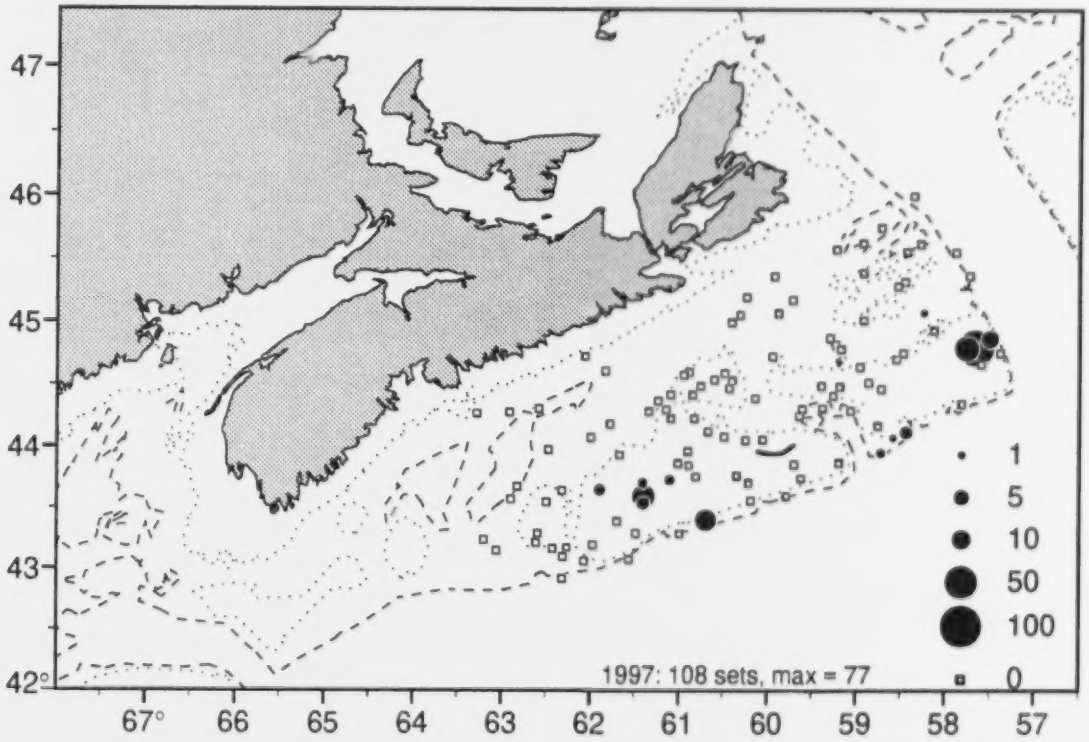


Fig. 76. 4VsW Winter Skate Biomass (kg/tow) from the 1997 Summer Groundfish Survey.

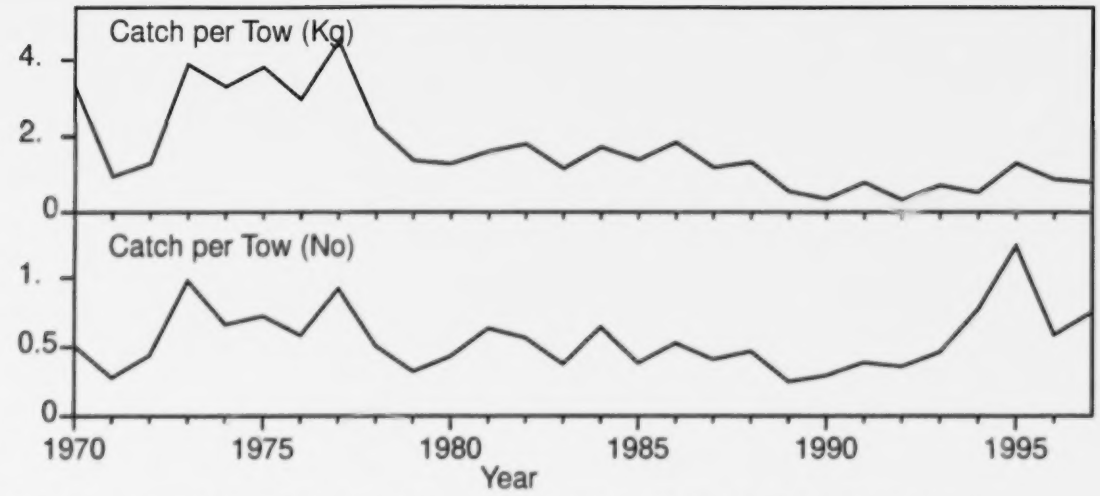


Fig. 77. 4VWX Monkfish stratified mean Weight and Number caught per tow from the Summer surveys.

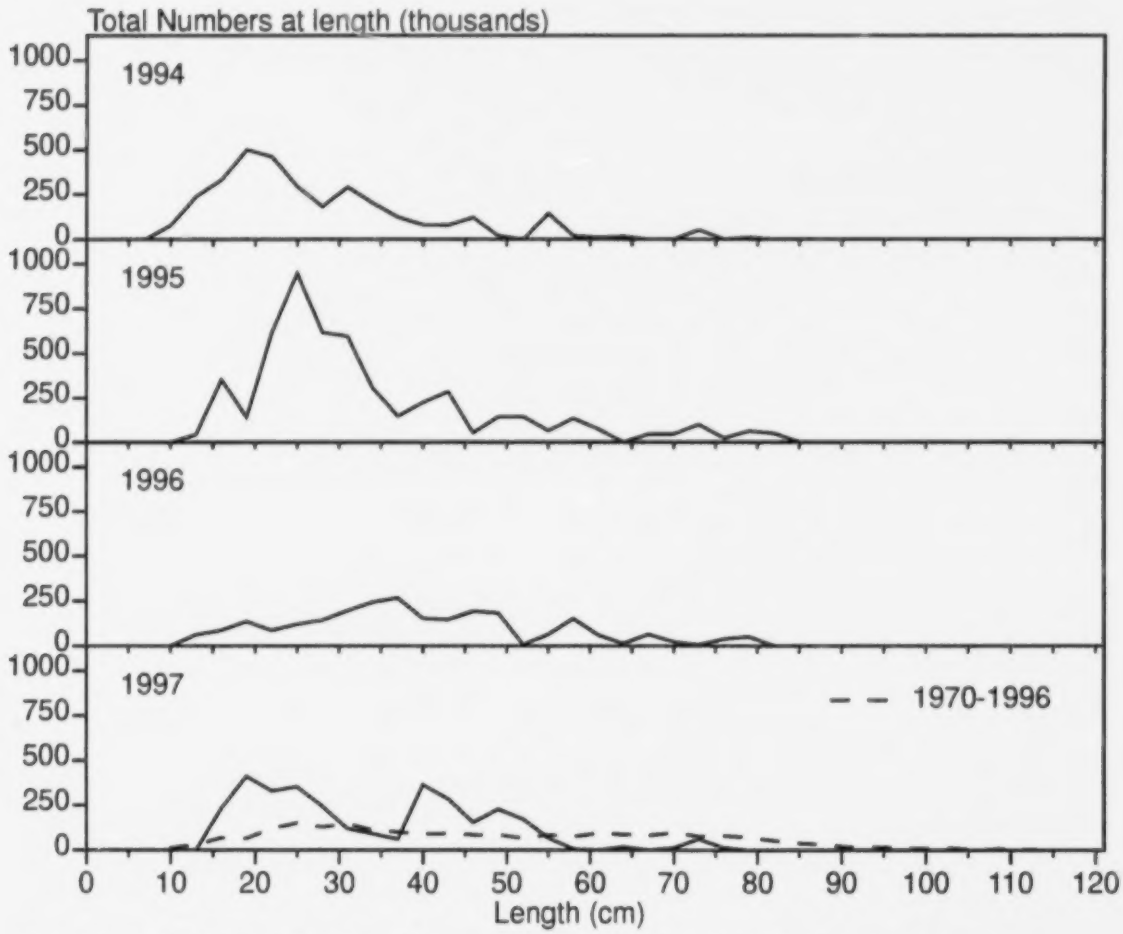


Fig. 78. 4VWX Monkfish length frequency distribution from the Summer surveys.

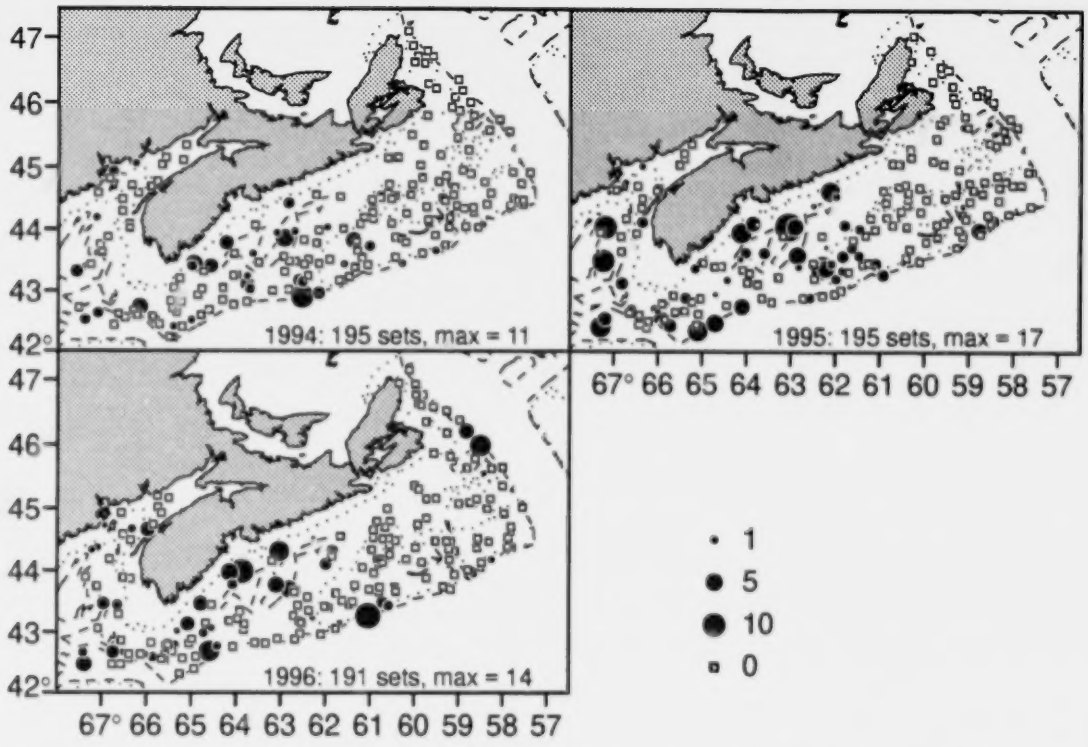


Fig. 79. 4VWX Monkfish Biomass (kg/tow) from the 1994-1996 Summer Groundfish Survey.

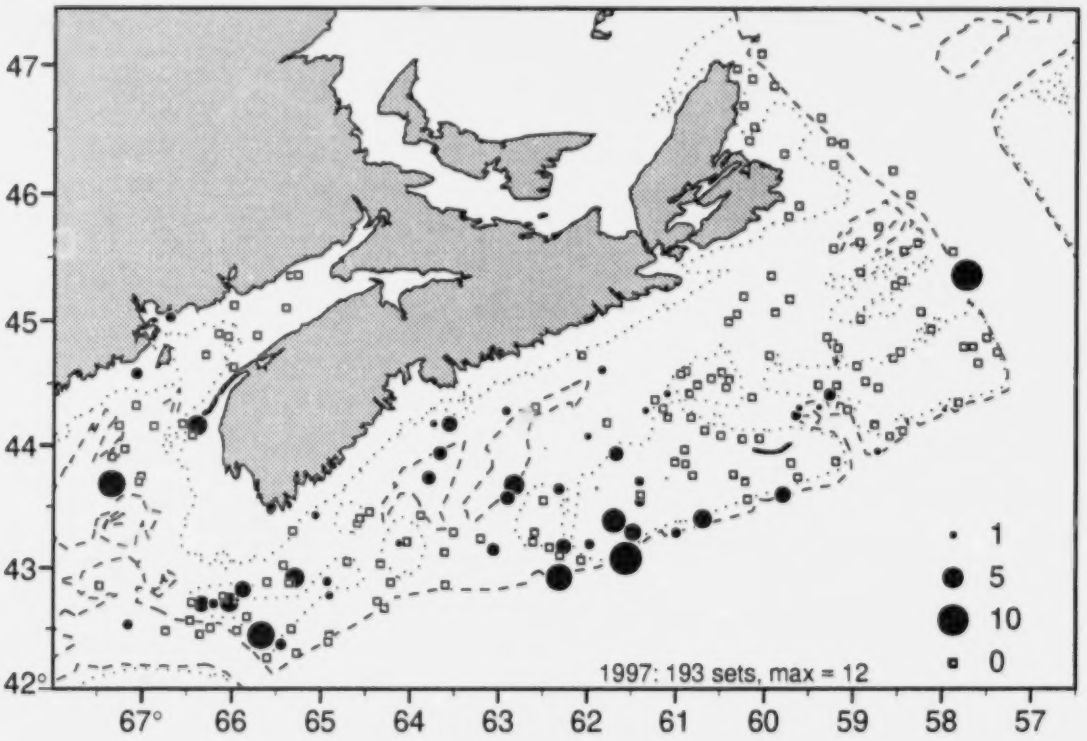


Fig. 80. 4VWX Monkfish Biomass (kg/tow) from the 1997 Summer Groundfish Survey.

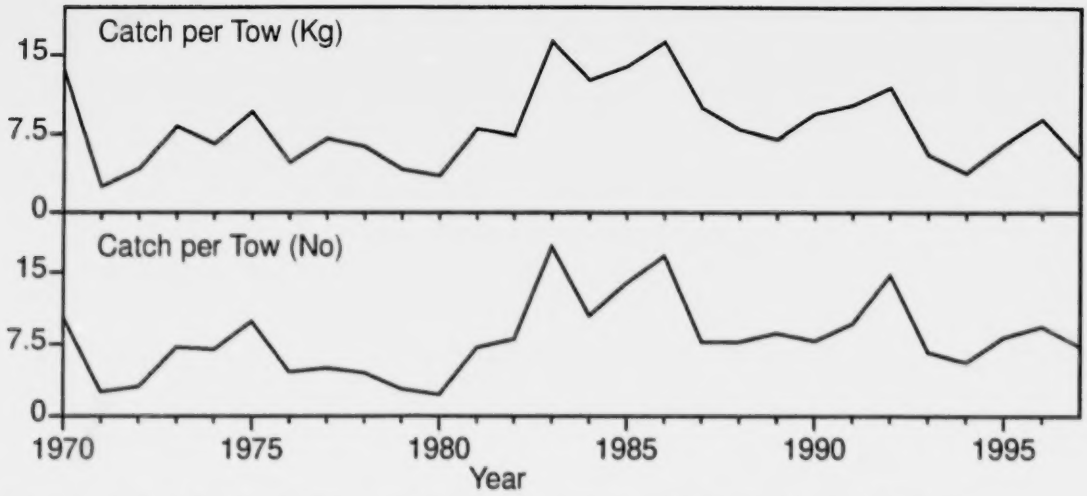


Fig. 81. 4VWX White Hake stratified mean Weight and Number caught per tow from the Summer surveys.

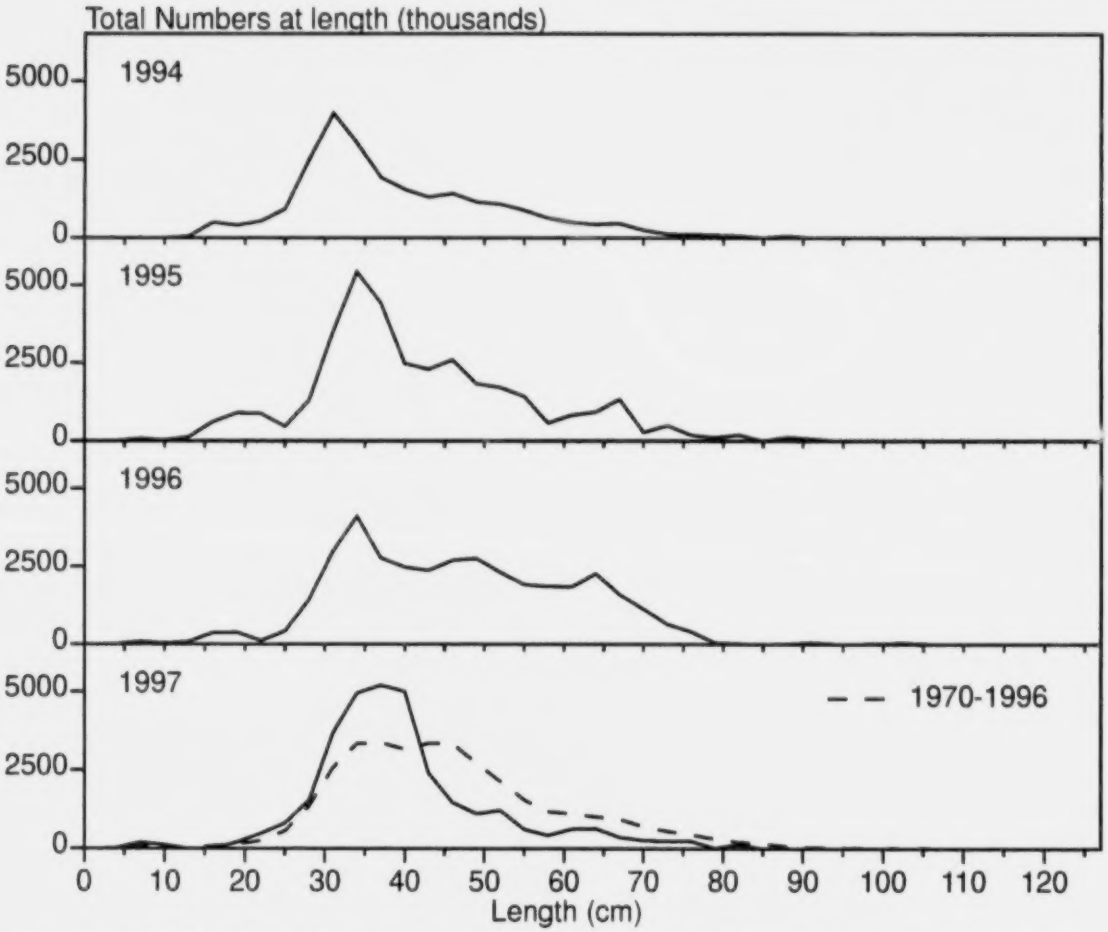


Fig. 82. 4VWX White Hake length frequency distribution from the Summer surveys.

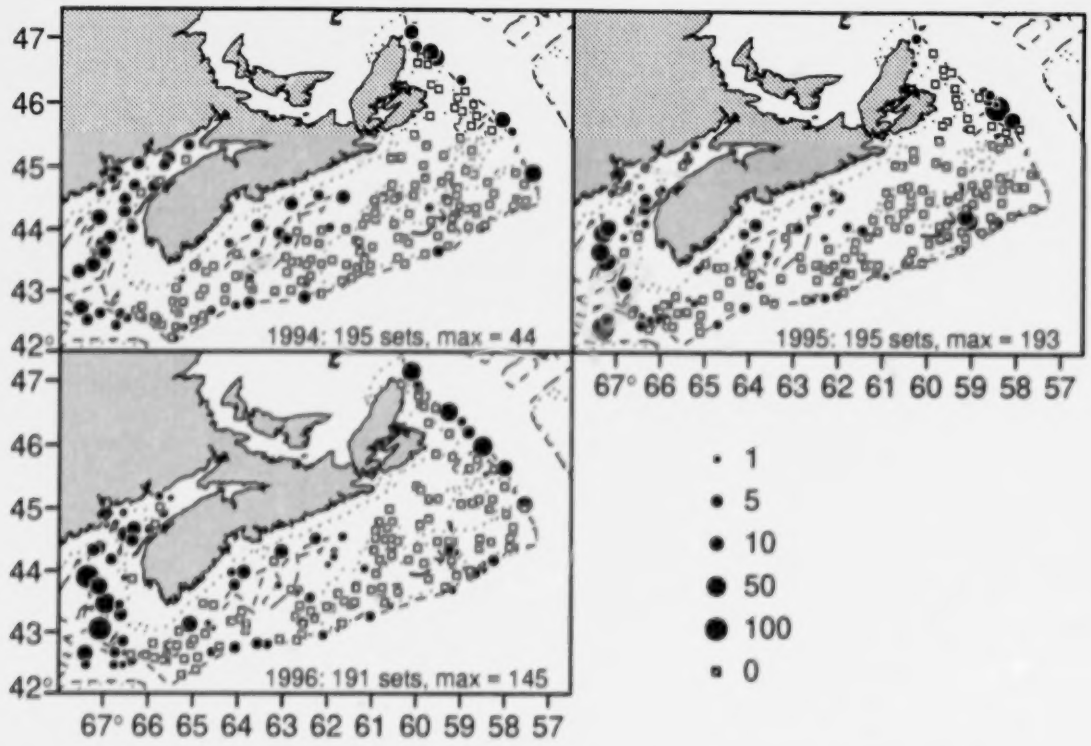


Fig. 83. 4VWX White Hake Biomass (kg/tow) from the 1994-1996 Summer Groundfish Survey.

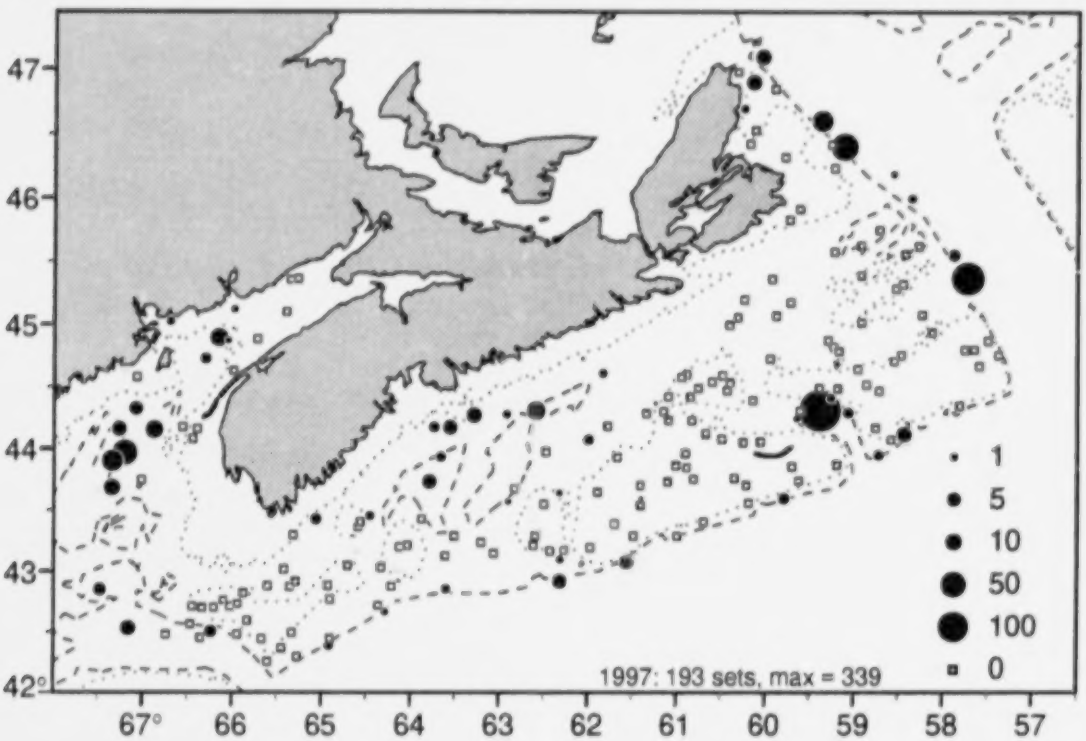


Fig. 84. 4VWX White Hake Biomass (kg/tow) from the 1997 Summer Groundfish Survey.

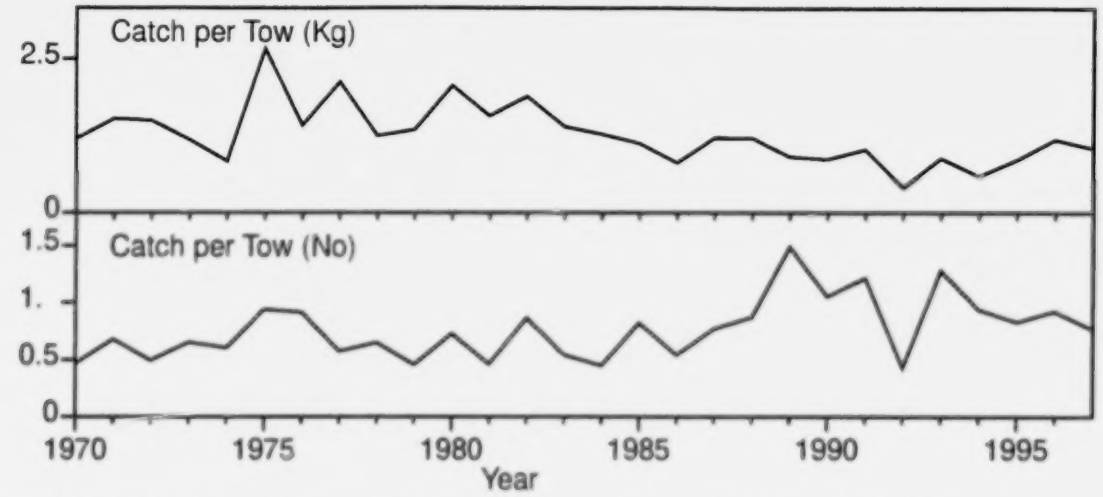


Fig. 85. 4VWX Wolffish stratified mean Weight and Number caught per tow from the Summer surveys.

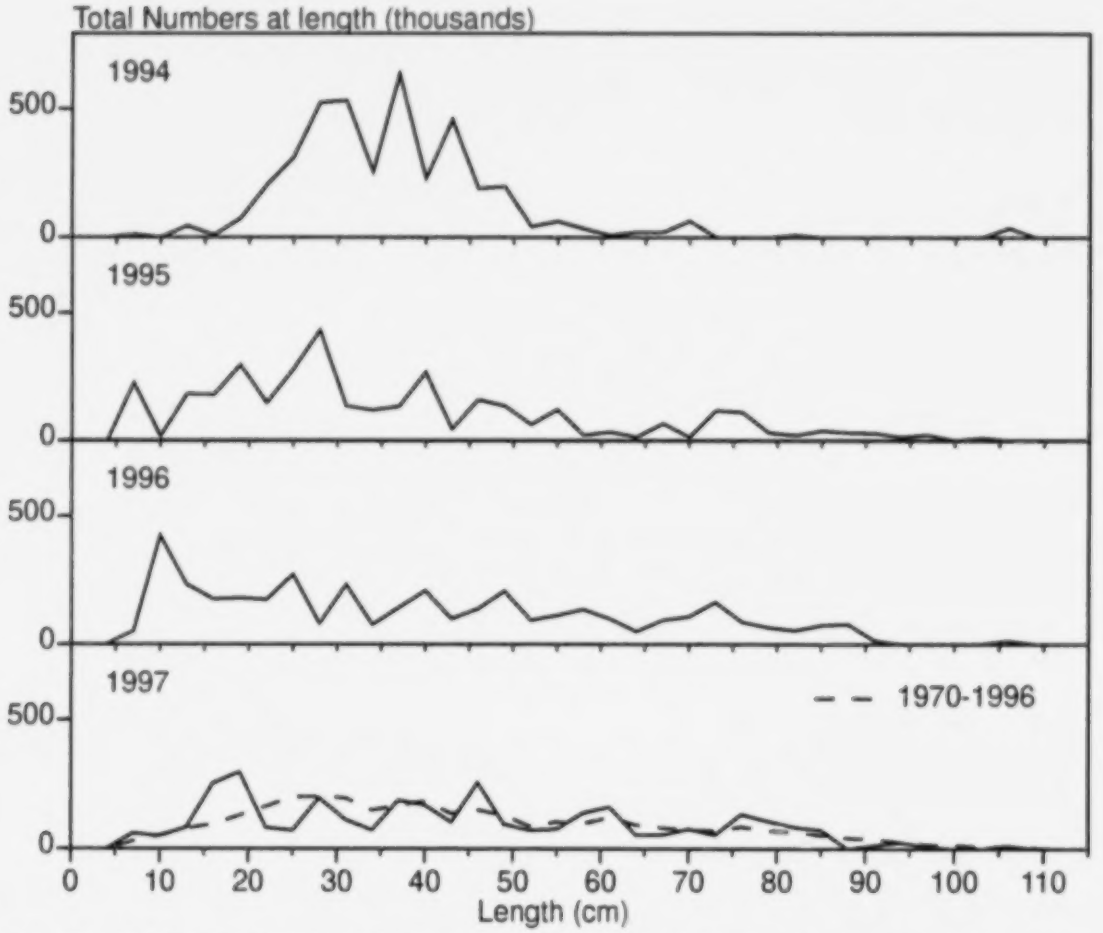


Fig. 86. 4VWX Wolffish length frequency distribution from the Summer surveys.

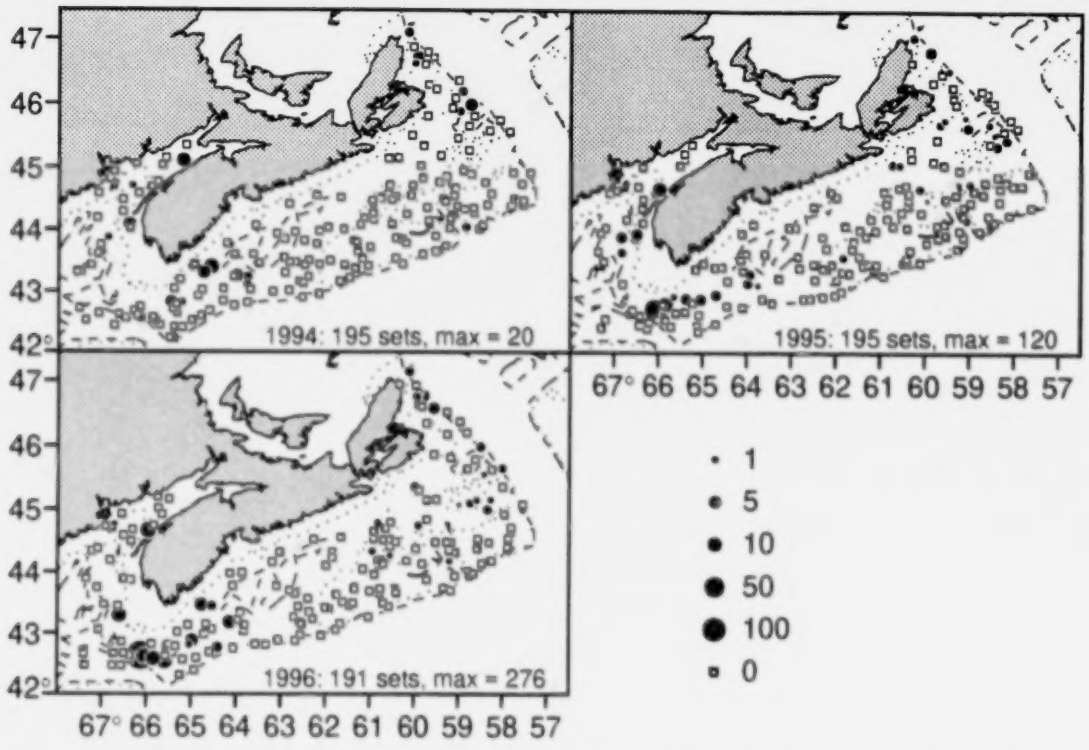


Fig. 87. 4VWX Wolffish Biomass (kg/tow) from the 1994-1996 Summer Groundfish Survey.

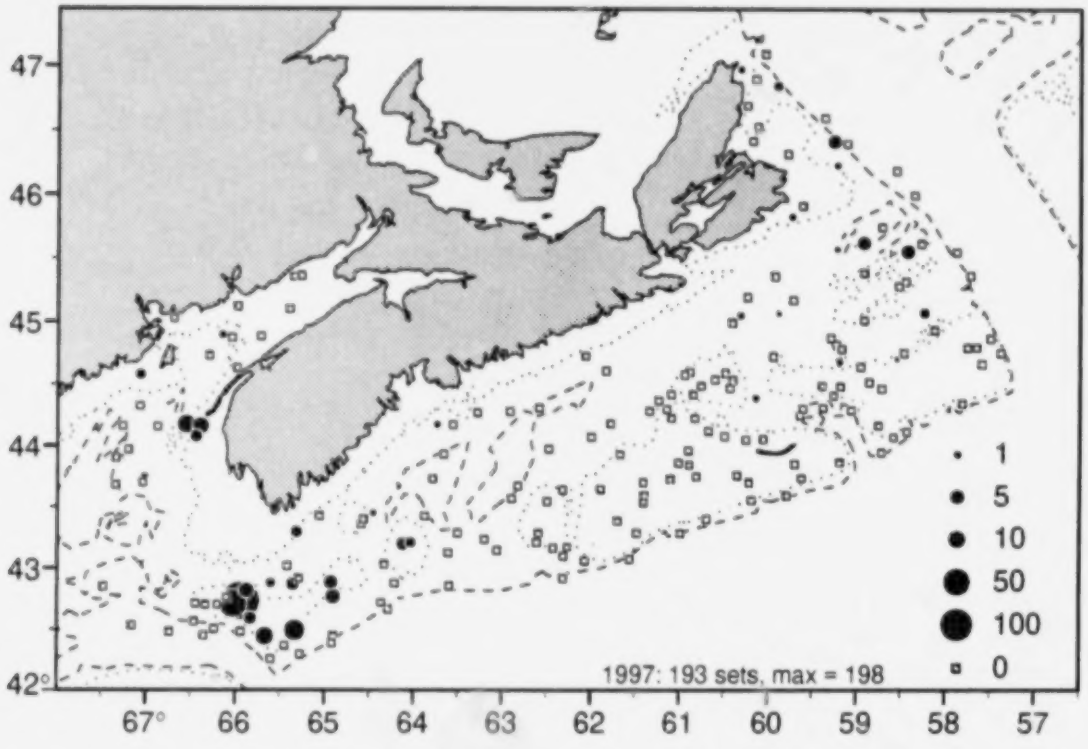


Fig. 88. 4VWX Wolffish Biomass (kg/tow) from the 1997 Summer Groundfish Survey.

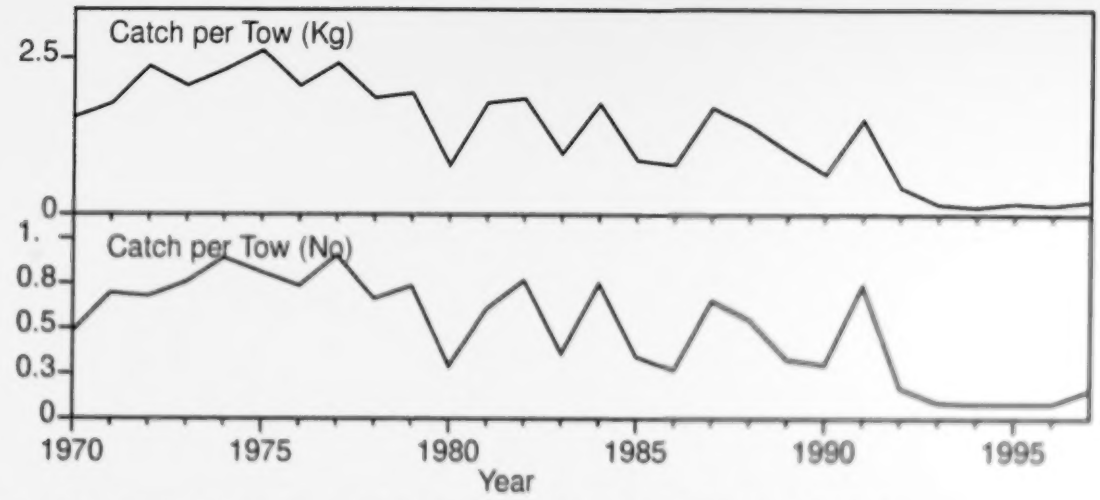


Fig. 89. 4VWX Cusk stratified mean Weight and Number caught per tow from the Summer surveys.

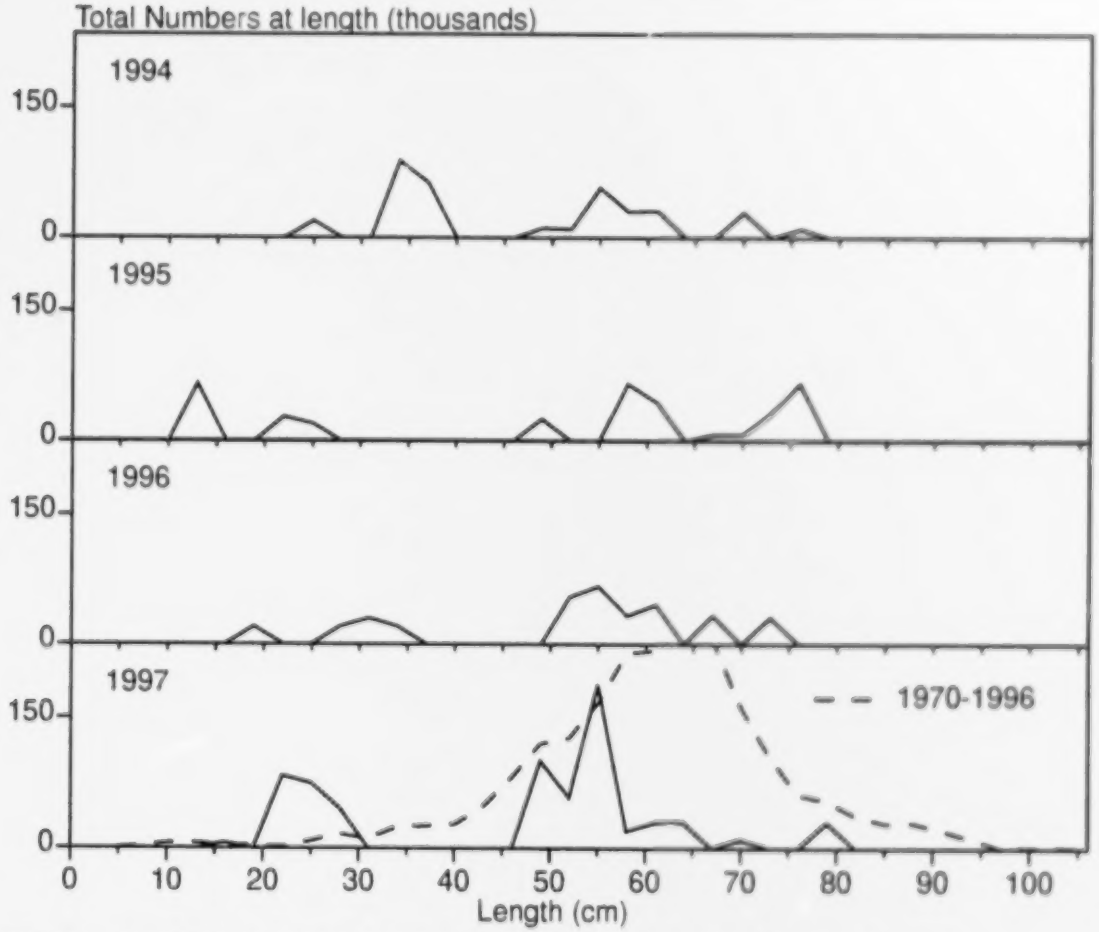


Fig. 90. 4VWX Cusk length frequency distribution from the Summer surveys.

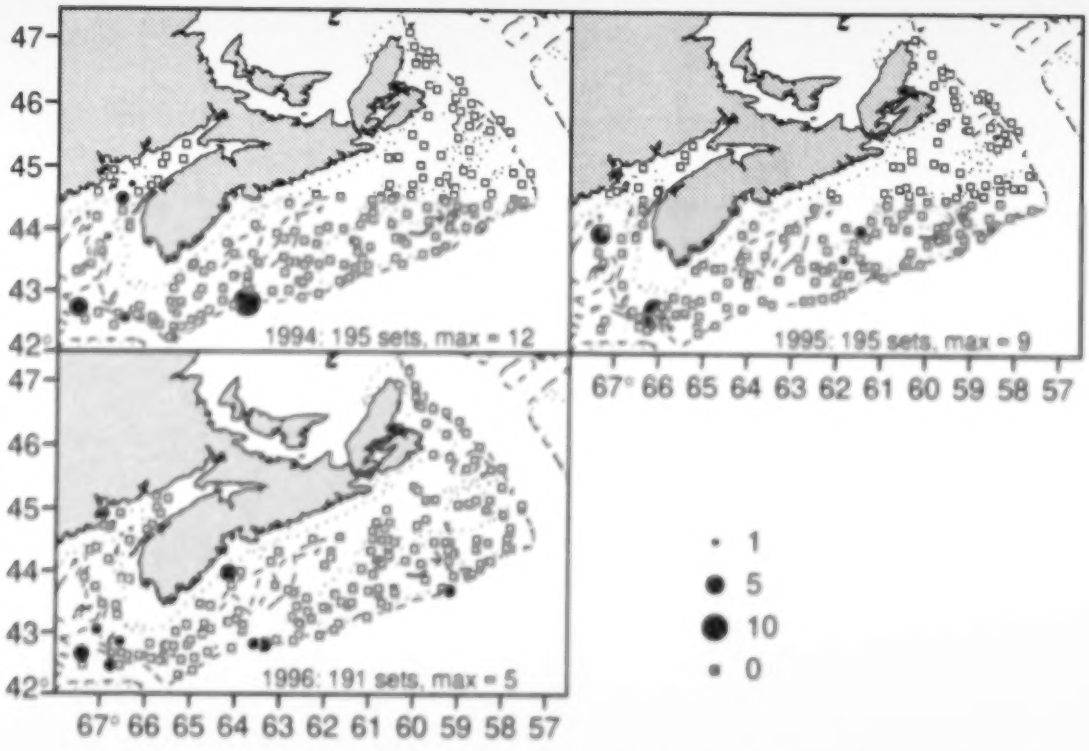


Fig. 91. 4VWX Cusk Biomass (kg/tow) from the 1994-1996 Summer Groundfish Survey.

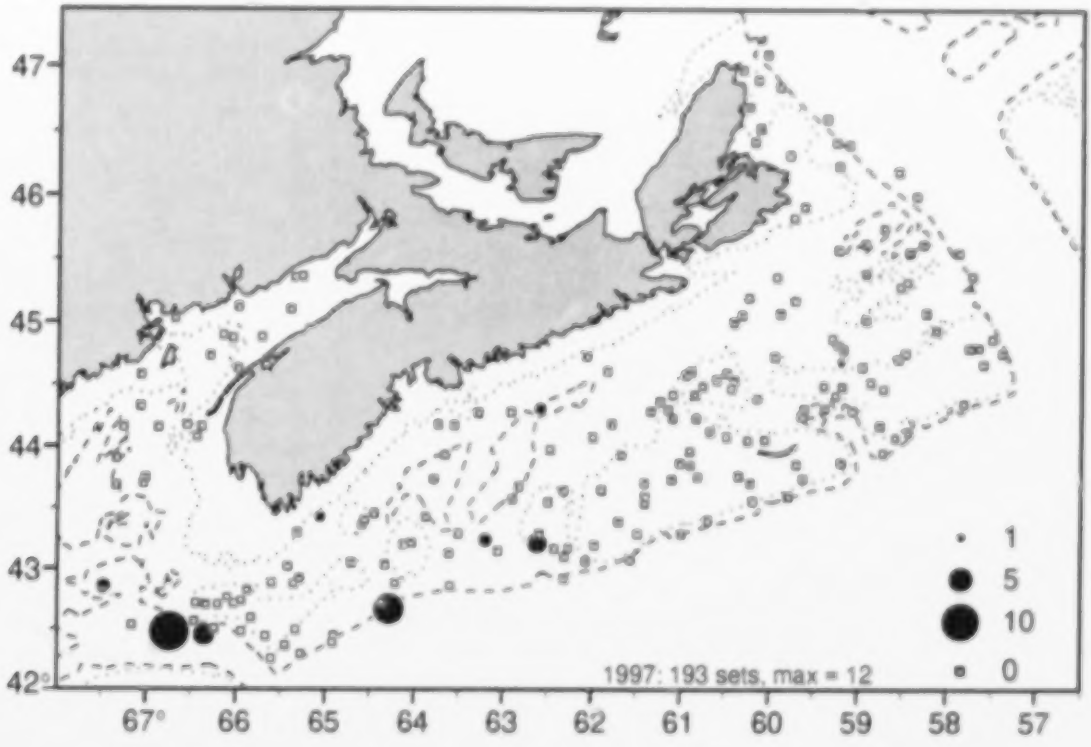


Fig. 92. 4VWX Cusk Biomass (kg/tow) from the 1997 Summer Groundfish Survey.

APPENDIX I

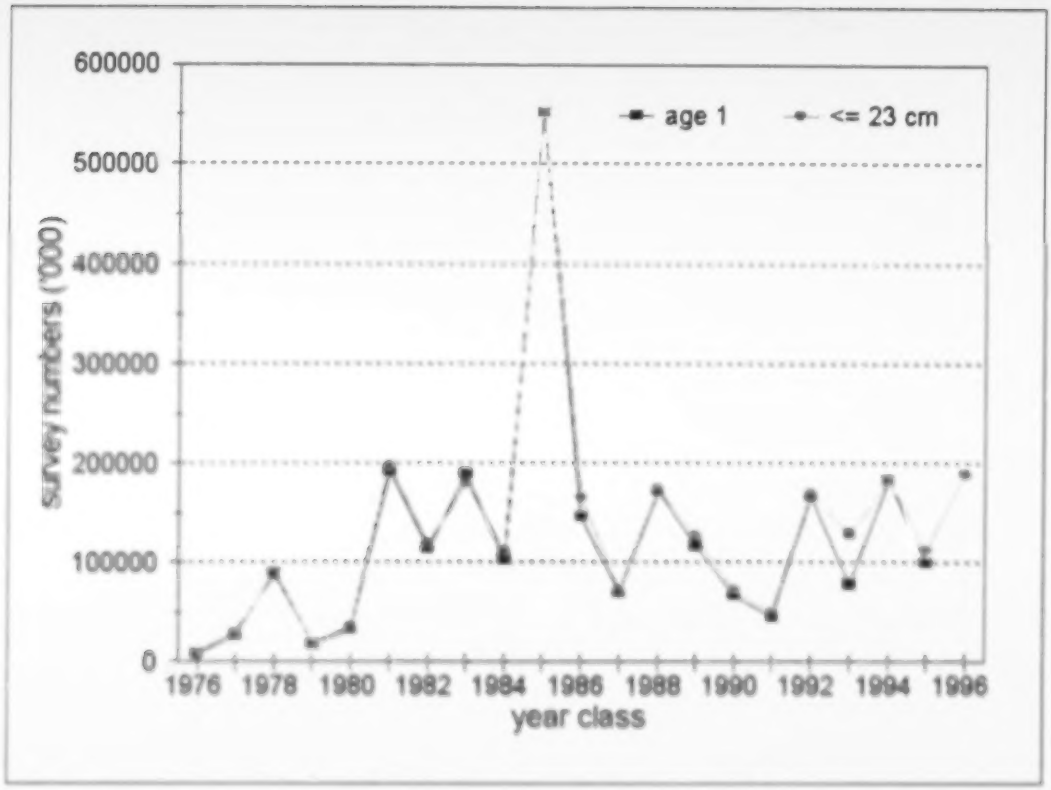
Revised 1998 $F_{0.1}$ Catch Projection for 4VWX Silver Hake.

By M.A. Showell

At the June 1997 meeting of the NAFO Scientific Council, the following statement was included with the advice for silver hake catch level in 1998 *"Although the 1998 catch at $F_{0.1}$ is calculated at 65,000 tons, about 20,000 tons of this is contributed by the 1996 year-class. The high level of uncertainty about the estimated size of this year-class should be taken into account by discounting its calculated contribution, to some extent, when determining an appropriate TAC level for 1998"* (NAFO SCS Doc. 97/14). The 1996 year-class was estimated to be more than twice the long term average, at 1.8 billion fish, based on the results of an O-group survey, and accounted for 32% of the projected catch in 1998. Concern was expressed over the reliability of this estimate, as it lay outside the range of estimates on which the O-group/SPA age 1 relationship was based. Further, the 1996 survey point had the highest CV in the survey time series.

It is now possible to estimate the strength of the 1996 year-class at age 1 based on the results of the 1997 summer groundfish survey. Aging of silver hake collected on the summer survey has not been completed. However, the mode of age 1 fish in length frequencies from this survey series is quite distinct. A comparison of stratified abundance for fish 23 cm in length or less to age 1 numbers, for years where age data are available (Appendix I, Figure 1), shows good correspondence, indicating that this size group provides an accurate approximation of age 1 abundance.

Based on the relationship between SPA age 1 and July RV age 1 numbers, the estimated size of the 1996 yearclass at age 1 is 1.1 billion fish. This estimate of yearclass size is likely the more reliable, as the predictive ability of the relationship is higher than that of the O-group/SPA age 1 relationship, and no extrapolation is required. The projected catch at $F_{0.1}$ in 1998 is 55,000 mt, when this revised estimate for the 1996 year-class is used.



Appendix 1 Figure 1: Relationship between stratified age 1 and <= 23 cm abundance estimates from the July RV survey, for 4VWX silver ahke 1976-95.